

THE APPLE II MAGAZINE



Editors' Choice
The Apple Personal Modem

Special Holiday Gift Guide

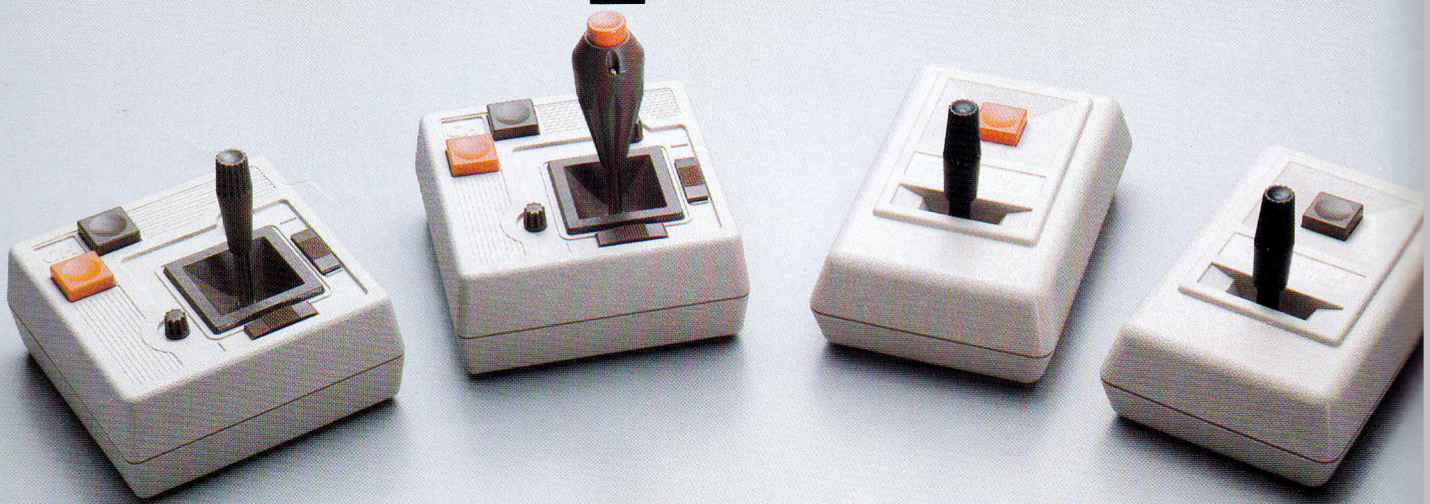
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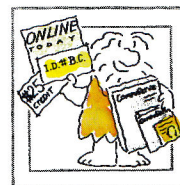
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ARTICLES

18

Thanks for the Memory

by Bob Ryan

inCider's technical editor reviews three popular auxiliary-slot RAM expansion cards that can make your Apple a powerful business machine.

28

Gray Flannel Sorts

by Peter C. Lincoln

There's more than one way to sort a data base—this graphics program demonstrates five techniques on screen.

38

The Gemini 10X: A Reformed Character

by Phillip M. Jockell

Your Gemini 10X can print a slashed zero—our program lets you define its shape, then download to your printer's RAM.

46

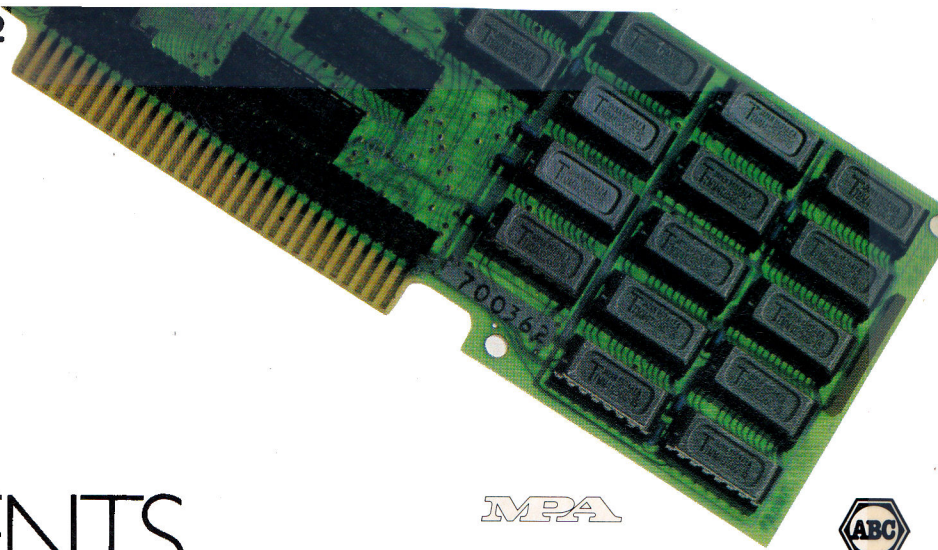
Holiday Gift Guide

inCider presents a host of holiday gift ideas for your favorite Apple II user.

149

inCider's 2-Bit Programming Contest: Winners Announced!

What can you do in two lines of Applesoft code? Plenty—just take a look at the top three entries in our 2-bit challenge.



DEPARTMENTS

MPA

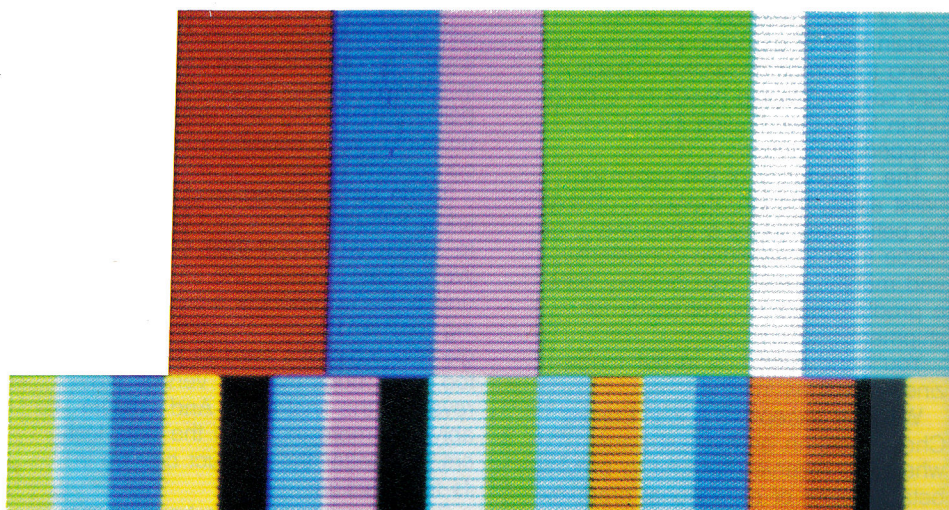


Editorial	6
Letters	8
News Line	14
<i>Tee Off; Computer Law; A New Order</i>	
BackTalk	56
<i>This month's survey: Christmas wishes</i>	
Applesoft Adviser	65
<i>Trivial Trivia: Part 2</i> by Dan Bishop	
Ask inCider	81
<i>Strings & Things; Controls in File Names; Garbage Collection</i>	
Pascal Primer	88
<i>Facts on Filer: Part 2</i> by Tom Swan	
Apple Clinic	101
<i>Trains Again; 80-Column Cards; //c Ports</i> by Jim Sather	
Right of Assembly	106
<i>An Assemblage of Assemblers</i> by Roger Wagner	
Reviews	118
<i>UniDisk; Visible Pascal; Kyan Pascal; V-Color Graphics Tool Kit 1.0; Remember!; Peterson's Financial Aid Service and Peterson's College Selection Service; Standard & Poor's Stockpak II; Willy Byte in the Digital Dimension; Think Fast</i>	
Extract	134
New Products	136

DataGram	140
by Matthew Lesko	
Game Room	145
<i>The Railroad Works; Baltic 1985; Micro League Baseball; World's Greatest Baseball Game; Wishbringer</i> by Brian J. Murphy	
Hints/Techniques	150
<i>Portal Update; Multipage Dump; Picture Combine</i>	

Coming Attractions	156
Reader Services	156
Editors' Choice	160
<i>Apple Personal Modem</i>	

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EDITORIAL

Great Expectations



by Susan Gubernat

Recently, the following item from *The Boston Globe* created a bit of a ripple in our offices:

"Paradox, a software program made by Ansa Software, was shipped to dealers three days before it was officially announced, venture capitalist Benjamin Rosen said last week. In an industry known for 'vaporware,' or software that never materializes, Rosen was justly proud."

Paradox, indeed, we thought.

We've all grown jaded enough to bide our time when we first hear the distant, then ever-widening, circles of new-product rumors, followed by a deluge of press releases. We've learned a certain kind of grudging patience after going to a trade show like COMDEX, let's say, and laying hands on a product in May, then finding it's still not shipped in October.

The impertunity of the eager journalist aside, though, there's probably no better way to try a consumer's patience than to advertise consistently, and months away from delivery date, a product that's not yet ready for shipment.

You'll find such ads in our magazine as well as in others.

With the exception of our Editors' Choice column on the last page, where we reserve the right to preview beta versions of exceptional products that come to our attention, our policy is to review products only in their final versions. All things being equal, our reviewers are appraising the same version of software, the same configuration of hardware that you'd buy from your retailer or through the mail.

So we're well aware that a full-page advertisement, even accompanied by a coupon to be clipped and mailed along with paper or plastic payment,

doesn't necessarily mean availability. We know this because "final versions" of products sometimes reach our offices months after they've appeared among our ad pages.

Let's not be naive, either, about the power of suggestion—blatant or subliminal. Marketing people aren't dummies. Their job is to create expectation, even need. And that they do eminently well.

But there's a cut-off time, too—and I wonder if anyone has determined what it is—between excitement about and anticipation of a product, and other stages: consumer anxiety, frustration, even anger and resentment toward the company that's advertising but not shipping.

The press has been accused, along with the marketers, of touting "vaporware": products that are still gleaming in some developer's eye. Through our policy of reviewing only deliverable products, we're keeping your—the consumer's—interests in mind.

To be fair to advertisers, we also know that their plans can be subject to situations beyond their control. We've seen (literally) the inventory of one of these products a-building, waiting for the delayed shipment of a single microchip. It's hard to predict, too, what bugs that last version will reveal in the final tests. And presumably, the more thorough the beta testers, the better the product can be in its final version.

Some companies have handled the time gap between announcement and delivery date by indicating a date of availability in the ads themselves. "Coming soon" or "at your local theater this summer" works for trailers in the movies. Why not an analogous banner for microcomputer advertising? I find I'm attracted to the ads that announce a date of readiness. To me they portray both a concrete promise of delivery and at the same time stim-

ulate an expectation that can reasonably be met.

What's the promise a famous vintner used to make in its advertising? "We will sell no wine before its time"—rather effective marketing, that.

Beyond the Operating System

Steve Jobs' split with Apple, and the subsequent litigation over proprietary product information—along with some key employees—that Jobs may have taken with him have occasioned more postmortems than an obituary page in a retirement-community newsletter could handle.

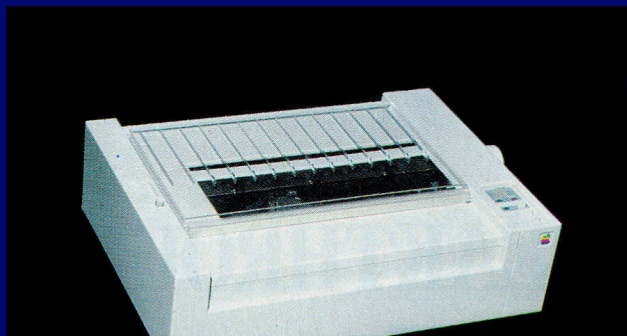
Let's not mourn Jobs; he can (and does) take care of himself. Recognize instead how much life there is after Apple for Apple alumni like Bill Cleary of International Solutions (The Mouse Series) and Jeff Raskin of Information Appliance. (Next month we'll be looking at his amazing SwyftCard, a //e plug-in board for writing, filing, communicating, and calculating that creates its own universe separate from DOS.)

The irony in Raskin's case, as he made clear to us, was that his intention to make the Macintosh (he was on the original development team) much easier to use than it is today was thwarted by Jobs. His—and others'—responses, though, have created a host of products that are extending the life of the Apple II—as aficionados of that computer, who continue to keep the user in mind, are bound to do.

As a newly defined, market-driven operation, Apple Computer now must stay close to the consumer. The positive indicators of this consumer consciousness range from increased dialogue with user groups to new-product releases for the II line (see last month's *inCider*), holiday price cuts, and, ultimately, the promise of upward compatibility for the new iteration of the II we all hope to see next year. ■

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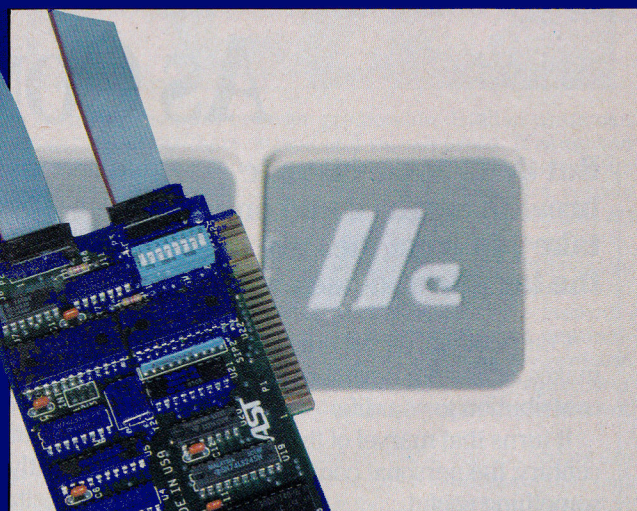
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UNDER FIRE!

It was quiet under the blistering Russian sun except for the rumble of gunfire off through the hills. Through his binoculars, the Soviet lieutenant could see the road leading into the dacha. The hedge blocked his view of most of the ground, and nothing could be seen moving among the second story windows. His orders were to take his squads and three T34/76 tanks in and occupy the abandoned country house.

From the wheatfields of Russia to the hedgerows of northern France, this is the world of **Under Fire**, the game of tactical World War II combat. Commanding an array of armor, infantry and support guns, take your men into the razor's edge of combat.

The lieutenant stood up and waved his arm in a circle. Around him arose fifty men who deployed in a line. Silently, they passed through the cool woods toward the hedge, their eyes scanning the windows, their fingers calmly resting on the trigger guards of their rifles.

Men and weapons from the United States, Germany and the Soviet Union are represented. The map is a topographic recreation of the ground they fought over, shown in three different scales. Choose the situational map for the strategic flow of battle, or the tactical screen that shows the terrain in amazing detail.

They were 30 meters from the hedge when the land exploded in smoke and flame. A machine-gun nest spoke from a window, sending the patrol to the earth. The hissing rocket from a panzerfaust caused one of the tanks to explode, its crew bailing out of all hatches. Two Panther tanks moved out from under their cover. The lieutenant ran forward in a crouch, waving to the squads that were not pinned under fire to follow.



Strategic and Tactical Maps.

Computer Requirements:

Apple® II family of computers (II+, IIe, or IIC), 64K One disk drive

Joystick required for II+; optional for IIe and IIC Mockingboard™ optional

TIME SCALE: varies.

MAP SCALE: From 12 meters/position to 72 meters.

UNIT SCALE: infantry squad, individual tanks and guns.

PLAYERS: One or two, also recommended for team play.

PLAYING TIME: From 10 minutes for a two-squad battle to five hours for 32-squad firefight.

COMPLEXITY: High.

SOLITAIRE SUITABILITY: Very high.

Under Fire is The Avalon Hill Game Company's trademark for its Microcomputer Game of World War II Infantry Combat

UNDER FIRE!



Front line combat is never predictable. Hidden units can appear out of nowhere, attack and vanish again. If caught in the open, a green squad can break and suffer horrendous casualties, while veterans rush for cover. In **Under Fire**, squads are rated for morale and training. The computer handles all line-of-sight problems, and can direct the fire of your units. Without the complexities of figuring odds and terrain charts, finding the proper strategy depends upon instinct and experience. All of the uncertainties of combat are present.

The lieutenant and his patrol moved swiftly and methodically through the woods. One of the T34's entered the yard and was trading shots with the Panther. A German squad was suddenly flushed from their hidden position and was cut down by the tank's machine gun.

Under Fire, lets you begin play immediately! All orders are entered using simple keyboard or joystick commands, and there is a helpful tutorial in the rulebook to take you step-by-step into your first battle. The nine scenarios range from open-field firefights to house-to-house conflict. Each scenario can be different when you change the ten variables, including nationality, skill level and victory conditions.

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Design your own maps and scenarios. It's easy with **Under Fire**. The Mapmaker disk can re-create the **bocage** of Normandy, the Russian steppes and the final assault on Berlin! Design the order of battle to emphasize infantry, armor or a mixture of the two. Choose among other factors, the weather, map scale, general orders and victory conditions. Order a squad to attack or defend terrain, destroy the enemy, delay the advance or break out of the pocket. Finally, save your own scenarios to disk and they'll be ready to play anytime (the computer is always willing to play). **Here's what you get:**

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- An extensive **rulebook**, containing all the rules, tactical notes, a tutorial to start you on your first scenario right away, and an index of screen commands.

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Questionable Commands

"Using ProDOS—Part 6" (August 1985) added a new wrinkle to the continuing series of misinformation presented to inCider readers. On page 43, Table 2 lists FP and INT as ProDOS commands—not bad, since these commands were never in ProDOS.

Apple Computer no longer publishes two manuals listed on page 44. They're available from Addison-Wesley Publishing—call (800) 238-3801. That company has published the *Technical Reference Manual* since May 15, 1985, and *Basic Programming with ProDOS* since April 15, 1985.

I believe you owe it to your readers to print a sequel to this series—"Using ProDOS, Unpart 1"—to correct the errors presented in parts 1–6. Production versions of ProDOS have been available since January 1984, giving the author more than ample opportunity to check his information before publication. I've been writing you with my comments for several months, and continue to find some of the same incorrect information in print.

Kenneth Kashmarek
 6 Cherokee Court
 Eldridge, IA 52748

inCider apologizes for treating FP and INT in the same manner as MAXFILES and NOMON. The former commands are discontinued DOS 3.3 commands that result in ProDOS syntax errors. The latter commands are also discontinued DOS 3.3 commands, but will not produce syntax errors in ProDOS. Apple left these commands in ProDOS to maintain compatibility with DOS 3.3 Applesoft programs, although they don't serve any purpose. Thank you for your update on the Technical Reference Manual and Basic Programming with ProDOS. —eds.

Searching Forth

Let me begin by saying that I really enjoy your magazine—I look to inCider as a solid source of accurate information.

I am writing about an ordinary problem. Before I purchased my //e, I owned a TL 99/4A. I used Forth with that system and really enjoyed it. Now I'm looking for a solid Forth program for my //e. Few people know anything about Forth, and I can't find any magazine reviews. I'd appreciate any information you could provide on Forth programs for Apples. I'm interested in a system with floating-point, hi-res graphics support and a liberal licensing policy. I'd like to write and distribute software with Forth as the supporting structure.

Anthony D. Alley
 PSC Box 147
 APO, NY 09321

In "Digital Dialects: A Guide to Apple Languages" (August 1985, p. 14), author Jeff Hurlburt includes a section on the Forth programming language. For more information, write to the Forth Interest Group, P.O. Box 8231, San Jose, CA 95155. —eds.

Enhancing Financing

I don't dispute Robert Alekshun's complaints about Apple Computer (Letters, July 1985, p. 8), nor do I refute inCider's response to him. Apple must expand as any business does. It should be commended for its ability to maintain a large degree of compatibility over the past ten years, when many other companies don't even make an attempt at compatibility in newer models.

The last two sentences in Alekshun's letter show his somewhat childish attitude. He has a considerable investment in his computer. When he is ready to upgrade it, he should "buy Apple." Probably the only item he would have to buy is the main CPU assembly. His disk drives, con-

troller, monitor, printer interface, and cards will most likely be completely compatible with the new CPU. Most, if not all, of his software should also be compatible.

Regarding his complaint about Apple's software working only on newer models, it is widely known that software sells computers. As a marketing strategy, distributing software that utilizes the greater capabilities of a new machine will increase sales of that machine. Apple is in the best position to distribute that software, and certainly can't depend on another company to do it.

I'm also concerned that my "unenhanced" Apple //e will become passé (it has the 6502 microprocessor, instead of the 65C02). As software authors begin using the additional capabilities of the new microprocessor, I won't be able to run certain programs because of that. I would like to get the enhancement, but keep the old chips, an arrangement I understand is against Apple's current policy. With the old chips still installed, I could do a little hardware modification and have a machine with dual processors.

Larry Cline
461 S.E. 39th Avenue
Hillsboro, OR 97123

Your response to Robert Alekshun paints a rosier picture than reality suggests. Many problems exist for owners of the older systems.

I'm a graduate student in comparative literature, and use Apple Writer //e extensively on an "unenhanced" //e (Eve) to prepare reports. My department uses a II Plus, an enhanced //e, and a //c. I consult the members of the department in the matter of purchases because the dealers in our area know so little about third-party products. Trying to find products that work on all these machines is a hassle.

We currently use the older Apple Writer only on the II Plus, and I use the //e version at home. Now the nightmare begins. If you have Apple

inCider

TeamMate... Top-Rated in inCider

TeamMate's Apple IIe Subsystems...

"In that category, the dark horse is TeamMate. It's fast, it can use a large-capacity floppy-disk drive either as an additional storage or for incremental backup, and it's just too simple to use to pass up. Consequently, it's my hands-down favorite and my only choice for a business environment needing a stand-alone hard disk."

—Bill O'Brien, inCider Magazine
September 1985

Yes!...TeamMate's Apple IIe Subsystems Now Support ProDOS, DOS 3.3, CPM and PASCAL!

Now your Apple IIe can have the best storage system available, no matter what operating system you use. In fact, you can now run a combination of operating systems on a single TeamMate subsystem!

Replace up to 19 Apple floppies with one TeamMate diskette.

Your Apple IIe can have high capacity data storage like a Winchester while you enjoy the convenience and familiarity of a standard floppy regardless of your operating system. TeamMate's flexible disk drive from Eastman Kodak gives you 2.78 megabytes of data storage on one diskette. You get expandable storage and access to Winchester capabilities... at a very low cost.

TM 2203... A single Kodak flexible disk drive giving you 2.78MB on one diskette.

TM 2206... Two Kodak drives for a total of 5.56MB of online, expandable storage.

TM 2210... 10MB of Winchester storage.

TM 2220... 20MB of Winchester storage.

TM 2213... A 10MB Winchester combined with the Kodak 2.78MB flexible drive for built-in back-up.

TM 2232... 32MB of Winchester storage—the ultimate in high performance mass storage.

TeamMate Model	Quantity 1-2	Quantity 3 +
TM 2203	\$ 795	\$ 716
TM 2206	\$1195	\$1036
TM 2210	\$ 895	\$ 850
TM 2220	\$ 995	\$ 950
TM 2213	\$1495	\$1356
TM 2232	\$1495	\$1356
Kodak Diskettes	\$ 15	\$ 14

All TeamMate subsystems include drive(s), controller, TeamMate chassis, power supply, necessary cabling, and manual. Kodak subsystems include a Kodak diskette.



TeamMate

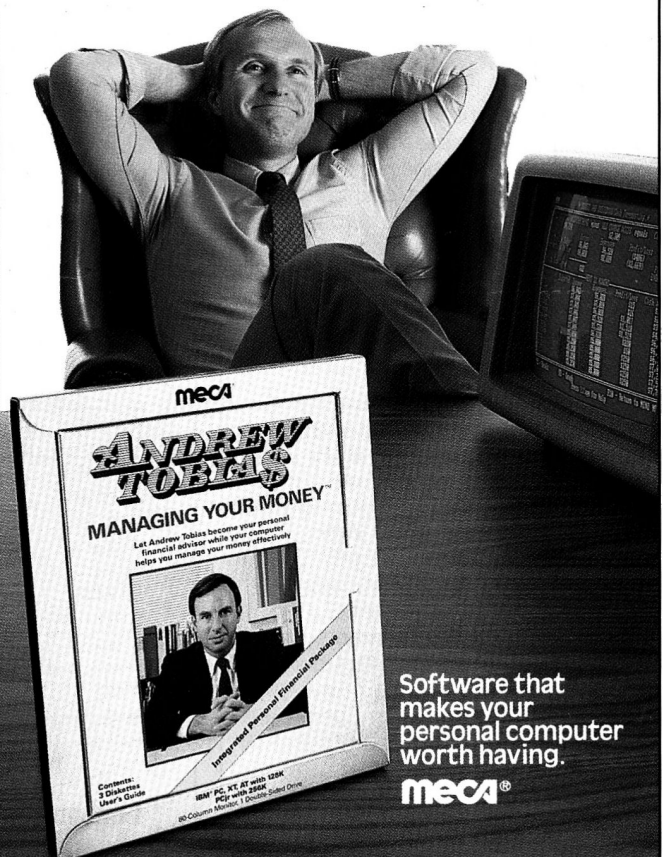
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 THE ONLY FINANCIAL
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Writer II Plus, you do not qualify for the upgrade to the new ProDOS version. If you have Apple Writer IIe, you were qualified until August 1, 1985. This means I can get the upgrade, which costs \$50, but the office can't. I can't supply the office with a copy without violating copyright laws, so the office must purchase the new version. If it does, every time a file developed on the II Plus is used with the new program, it must be converted to ProDOS. Furthermore, we can't change entirely to the ProDOS version, since that would exclude the II Plus from our system. We could solve all this if Apple would simply make a renewed commitment to the II Plus by providing compatible versions of new programs. My friends, my dealer, and I know of no such programs.

I'm an ardent, loyal fan of Apple computers, but at this point, the relationship is strained.

J. William Hayes
104B Sue Ann Court
Carrboro, NC 27510

Dealership Dilemma

I've recently had a rather severe problem with one of your advertisers. I had some difficulty with the RamWorks memory-expansion card, so I called the manufacturer, Applied Engineering, with a couple of questions. The man to whom I spoke asked me where I had purchased the card. I had ordered it from Coit Valley Computers (Dallas, Texas), and when I told him, he refused to give me any information. He said he could lose his job if he did, and implied that I may not have a "legitimate" card.

I have never heard of anything like this before. Obviously, Applied Engineering is having some sort of problem with its distributors or dealers, and seems to feel that I should be the one to pay for it.

While I realize Applied Engineering is a major advertiser in your magazine, I hope you feel an obligation to your readers to look into such an unethical, overtly hostile policy.

David Parsons
310 West 72nd Street
New York, NY 10023

My company, Coit Valley Computers, has recently had some bad experiences with Applied Engineering, manufacturers of the RamWorks card.

I contacted the firm about opening an account and was flatly rejected. I suspect it was because I sell at a inCider

mail-order discount and would compete with the company. I obtained the product through another of Applied's few dealers. This method of obtaining a product is very common for many retail operations.

Soon after, Applied Engineering placed an ad in a local Apple magazine; the ad warns that the company may not honor its three-year, "no hassle" warranty if customers don't buy cards directly from Applied Engineering or an authorized dealer. The ad further cautions customers to be suspicious if prices are below normal or are quoted by a mail-order firm. The following week I was contacted by a customer who said the people at Applied Engineering had rudely refused to even answer a minor technical question or honor the warranty, because they found out he had purchased the card from me. Since RamWorks packages do not mention one word about any warranty, it would appear that Applied Engineering's three-year, "no hassle" warranty, seen only in ads, is both subject to any interpretation Applied Engineering cares to use, and is anything but "no hassle."

Coit Valley Computers would like to reassure its customers that we will honor any warranty that Applied Engineering refuses to on Applied products purchased from us. We have also discontinued Applied Engineering products in favor of Checkmate Technology products.

Michael B. Norton, D.V.M.
Coit Valley Computers
14055 Waterfall Way
Dallas, TX 75240

Applied Engineering has ended its policy of denying support to customers who don't buy through its company or an authorized dealer. According to Dan Pote, Applied Engineering urges consumers to buy from an authorized source, but the company will not penalize those who don't. —eds.

inCider welcomes readers' comments regarding articles, letters, or other topics of interest. We reserve the right to edit letters for clarity, style, and space. Please address your correspondence to Letters, inCider, 80 Pine Street, Peterborough, NH 03458.

MANAGING YOUR MONEY[™] IS NOW AVAILABLE ON APPLE IIe AND IIc.

Special Introductory Edition!

Contains both 5¼" and
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APPLE IIe, IIc (128K, 80-Column Monitor, Two Drives)

AppleWorks



Only Pinpoint adds pictures to any AppleWorks document. So you can create party invitations that are truly exciting. Even if the weather isn't.



Don't spend hours addressing envelopes and misspelling names. Pinpoint picks up names and addresses from invitations (or any documents) and drops them, letter perfect, onto envelopes. Even if you don't always spell those tongue-twisting names right, at least you'll be consistent.

One glance and you can see your social schedule for months ahead. So it's a snap to slip this year's party in between the garlic festival and your breakdancing lessons.



Jot down important thoughts whenever they strike. The note pad is perfect for reminding you of things you can't do without. Or things you can.



Impress a friend with a personal invitation. It's easy. The automatic dialer finds phone numbers displayed anywhere on the screen, not just in special files.

And it re-dials busy numbers automatically. So you're next in line as soon as your friend's broker hangs up.

Accessories. \$69.

Nine accessories to be precise. And in no time, they'll be so much a part of your AppleWorks routine, you'll think of them as built-in, not added-on. Why? For openers, these handy desktop timesavers "pop-up" via windows from inside AppleWorks (*and most other ProDOS programs*). So you can stop what you're doing to jot down a note, address a letter, or call a friend.

You can even figure out some figures with our calculator. Tap data bases or other computers through our communications window. Even whip out short memos, forms and labels with our line-at-a-time typewriter. And then continue AppleWorks without missing a beat. Or a byte.

What's more, Pinpoint's as easy to use as AppleWorks itself. Same commands. Same hardware.

Plus you can boost Pinpoint's performance by adding an Apple Extended Memory Card, the new, high-capacity UniDisk 3.5 floppy, a hard disk, a modem, or one of many popular printers. And with our Pinpoint Toolkit, you can even add desktop accessories of your own.

Want more?

Then visit your local computer shop.

Or call (415) 530-1726 for a dealer near you. You'll see that Pinpoint does more than give AppleWorks a handful of accessories.

It gives AppleWorks the works.

Add the convenience of an appointment calendar, a telecommunications window, graphic and text merging, and six other desktop accessories to your AppleWorks program.

Pinpoint

SPECIAL PURCHASE—MAXIMUM PERFORMANCE BUNDLES

10MB SIDER Hard Disk, Siderware, plus Pinpoint for only	\$660.00
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64K RAMWORKS, AppleWorks Expander, Pinpoint, plus 256K RAM	\$278.00
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FAMOUS BRAND MODEMS, Bundled with Pinpoint

Prometheus 1200A, 1200 Baud External	IIc/IIe*/MAC*/IBM*	\$368.00
Prometheus 300c, Compact 300 Baud External Mounts on the IIc		\$208.00
Volksmodem 1200, 1200 Baud External	IIc/IIe*/MAC*/IBM*	\$238.00
ZOOM IIe, 300 Baud Internal	IIe/Enhanced IIe	\$188.00

*Requires \$10-15 cable and/or serial interface card. Subject to availability and price changes. Most items available from your dealer.

NEWS LINE

by Cynthia K. Carr, *inCider* staff

Making Par

Tee off anytime before April 30, 1986, and you could win \$17,000 in prizes from 1 Step Software's World Golf Hall of Fame Benefit Tournament. And the best part is you don't need a caddy to take in the 18 holes. The tournament comes packaged with Golf's Best Course Simulator Series from 1 Step Software. Golf's Best presents the golfing challenges found on the Pinehurst Hotel's famous No. 2 course in the sandhills of North Carolina.

To enter the tournament, send your best round on disk to 1 Step Software. You can play the course as often as you like, but tournament officials allow only one entry per person. The computer-golf simulation includes hazards, sloping greens, deep bunkers, and fairways.

"The response has been tremendous," President Martha Sharp says. "We've heard of people buying a computer just so they could play Golf's Best and the tournament."

The tournament winner earns entry into the 1986 World Golf Hall of Fame Pro-Am Invitational and a trip for two to Pinehurst. Other finishers will receive golf clubs, bags, and various prizes.

For more information, contact 1 Step Software, Charlotte Plaza, Suite 1300, Charlotte, NC 28244, (800) 525-GOLF, or (704) 554-7255 in North Carolina.

Long Arm of the Law

Lawmakers in California are setting a precedent other states may soon follow—a precedent not favored by the computer

industry. The California legislation, Assembly Bill 1507, establishes tougher warranties on the sale or lease of all new computer hardware and software costing \$25,000 or less.

Introduced by California Assembly member Gloria Molina, the bill prohibits manufacturers and sellers from assigning disclaimers on product warranties. Also, manufacturers would have to honor products with full refunds up to one year from purchase.

While Molina explains that the proposed law protects the consumer, *Info-World* reports the bill would make vendors pay twice the cost of the product, plus attorneys' fees if a consumer followed through with legal action.

If AB 1507 becomes law, every computer dealer and manufacturer selling its products in California will have to rewrite marketing and ad copy to conform to

new legal guidelines and restrictions. This policy extends to manuals, sales literature, point-of-sale materials, brochures, and documentation. Literature that is legally acceptable in other states may have to be altered to fit California law.

AB 1507 went before a state-Senate committee hearing on August 21, 1985, but because of opposition the bill was tabled. At press time, the California Legislature was scheduled to recess on September 13, 1985, so the bill will be carried over to the 1986 session.

Changing of the Guard

Apple Computer marks a new era in 1986 with the resignation of co-founder and chairman of the board Steven P. Jobs in September.

Jobs, who was relieved of day-to-day responsibilities in the corporation's restructuring this past May, will

Photo by COMSTOCK, INC./R. MICHAEL STUCKEY

INSIDE OUT

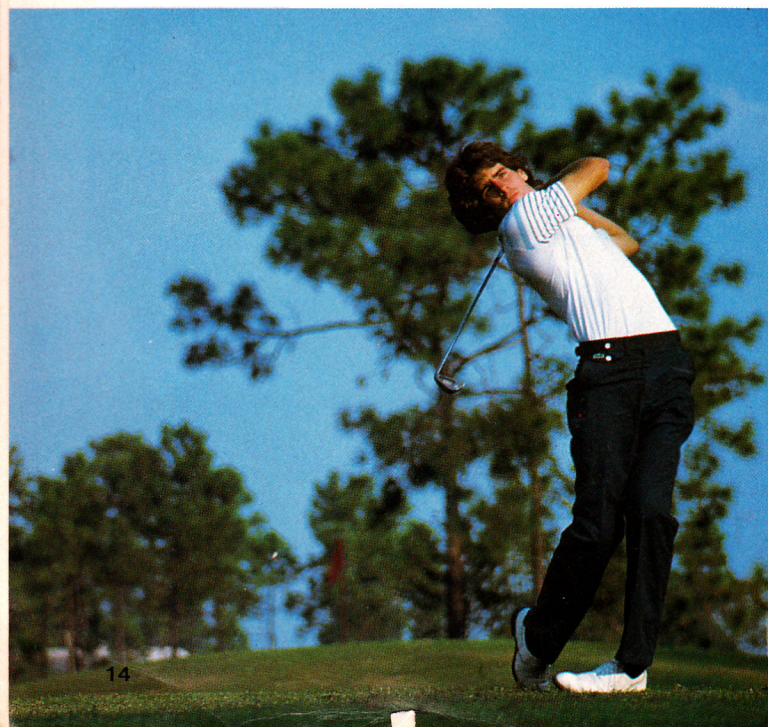
● **Give away.** . . As part of a \$350,000 educational campaign, Corvus and other software vendors are awarding ten school systems an Omninet network, a 45-megabyte hard disk, back-up system, print enhancement capabilities, and software. The program runs until November 29, 1985, and educators must have at least five Apple computer systems. Winners will be announced in December.

● **That's entertainment.** . . Despite the softening home-computer software industry, the market for home-entertainment software isn't petering out. Dataquest, a research firm, estimates that entertainment-software sales will escalate from about eight million units in 1984 to almost 14 million in 1989.

● **Helping out.** . . Program administrators at Eastern Kentucky University and Madison County Schools plan to use graphics, animation, and videotapes combined with teletext to help deaf and multiply handicapped teenagers learn sign language, reading and language skills. The program was made possible through an equipment grant from Apple Computer.

—Wendy Lea McKibbin
inCider staff

December 1985



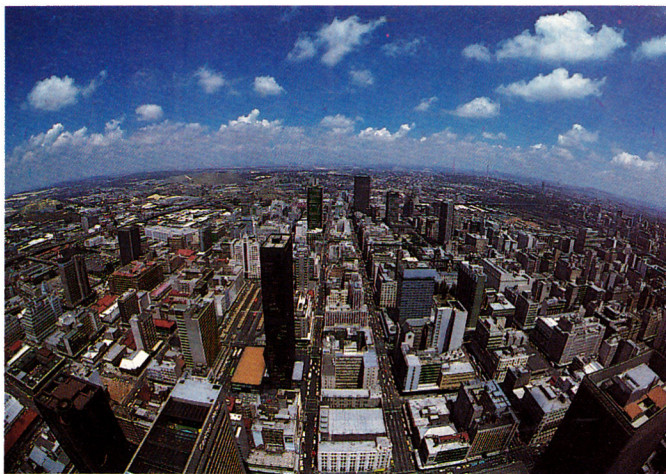


Photo of Johannesburg, South Africa by COMSTOCK, INC./ HARTMAN-DEWITT

start a new company aimed at developing computers for universities. According to *The Wall Street Journal*, such a computer would appeal to many universities looking for machines that go beyond what personal computers can offer. At press time, Jobs had not revealed the company's name.

Jobs' resignation startled members of the board when he announced that five Apple employees would join his new venture. They are: Rich Page, a senior engineer; Daniel Lewin, manager of education marketing; Bud Tribble, manager of software engineering; George Crow, manager of hardware engineering; and Susan Barnes, controller for sales and marketing.

The announcement came after industry sources speculated that Jobs' stock sale during the summer indicated his plans to move into politics or a new business. No sooner had Jobs filed with the Securities and Exchange Commission to sell 850,000 shares of Apple stock than he filed to sell another 500,000 shares. The sale represents 19.7 percent of his stock holdings.

Even after selling the stock, Jobs will still own 9 percent of Apple stock and remain the Cupertino-based company's largest stockholder.

Apart No More

Apple Computer joins the growing number of organizations discontinuing business

relations with South Africa because of that government's policy of apartheid.

According to the computer company, the sales restriction was to become effective October 31, 1985, when its contract with the South African distributor ends. The announcement concludes six years of business transactions between Apple and South Africa.

Micro Marketworld reported that Apple Computer International in Paris, the company's new international division, originated the proceedings and received approval from company headquarters in Cupertino, California.

High Cost of Change

Apple Computer's reorganization and consolidation of its operations last spring left the company with its first quarterly loss. The maneuvering, as reported for

the quarter ending June 28, cost Apple \$40.3 million, resulting in a net loss of \$17.2 million.

Apple reported that plant and equipment write-downs, facility-lease cancellations, and compensation were among the reorganization expenses. The \$40.3 million figure was larger than industry analysts anticipated.

The quarterly report also indicated that net sales were down 11 percent from last year. And a recent *InfoWorld* article reported that President John Sculley expects sales to "remain soft through Christmas."

We're always looking for news of the Apple world. If you're making news, send your press releases and photographs to News Line, inCider, 80 Pine Street, Peterborough, NH 03458.

CALENDAR

December 3-6 MICROCOMPUTER SYSTEMS IN GOVERNMENT

Washington, DC
contact:
Conference Manager
U.S. Professional
Development Institute
1620 Elton Road
Silver Spring, MD 20903
(301) 445-4400

December 4-5 CALIFORNIA COMPUTER SHOW

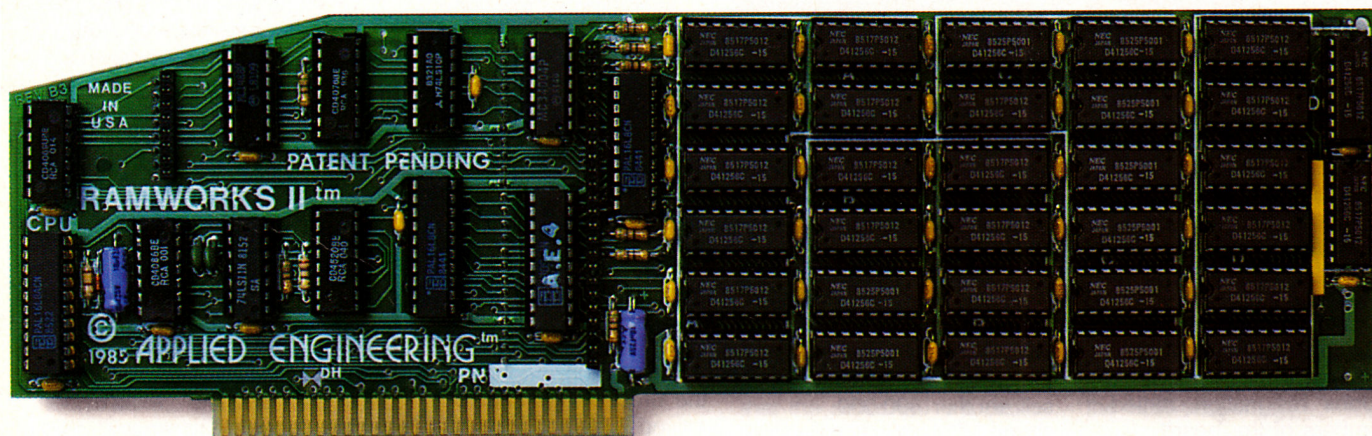
Palo Alto, CA
contact:
Norm DeNardi Enterprises
289 South San Antonio Road
Suite 204
Los Altos, CA 94022
(415) 941-8440

December 5-7 THE ASSOCIATION FOR PERSONS WITH SEVERE HANDICAPS—NATIONAL CONFERENCE

Boston, MA
contact:
Hiroko Roe
TASH
7010 Roosevelt Way N.E.
Seattle, WA 98115

Meet RamWorks II™

The Recognized Industry Standard For Memory Expansion of the Apple IIe.



RamWorks II. A Generation Ahead. Again.

The best selling expansion card for the Apple IIe just got even better. With RamWorks II, expand your IIe to an incredible 3 megabytes of usable RAM.

Turbo Charged AppleWorks.

RamWorks II plugs into the IIe auxiliary slot and acts just like Apple's extended 80 column card, only better—because if you buy a 256K or larger card, AppleWorks will automatically load itself into RamWorks II. This dramatically increases AppleWorks' speed and power because it effectively eliminates the time required to access disk drive 1. Now, switch from word processing to spreadsheet to database management at the speed of light. AppleWorks responds the moment your fingers touch the keyboard.

But AppleWorks has certain internal limits, independent of available memory. Fear not. Only RamWorks II (and the original RamWorks of course) removes those limits. Only RamWorks II increases

the maximum number of records available from 1,350 to over 16,000. Only RamWorks II actually increases the number of lines permitted in the word processing mode. And only RamWorks II features a built-in printer buffer, so you no longer have to wait for your printer to stop before going back to AppleWorks (256K or larger RamWorks II required).

With RamWorks II, you won't have to split your data into 2 or more separate files because you'll have the necessary memory to access ALL your data ALL the time, quickly and conveniently.

RamWorks II	AppleWorks Desktop
128K	101K
256K	188K
512K	378K
1 MEG	758K
1.5 MEG	1136K
3 MEG	2277K

The Most Friendly, Most Expandable Card Available.

RamWorks II is compatible with more off-the-shelf software than any other RAM card. Popular programs like Advanced VisiCalc, Magic Office System, Flashcalc, The Spread Sheet, Diversi-DOS, Supercalc 3A, Magicalc, etc. (and hardware add-ons like Profile and Sider hard disks). Fact is, only RamWorks is 100% compatible with all software written for the Apple 80 column and extended 80 column cards. In addition, RamWorks II can emulate most other RAM cards, so you can use programs written for them without modification. And any size RamWorks II can be user upgraded later to any larger size.

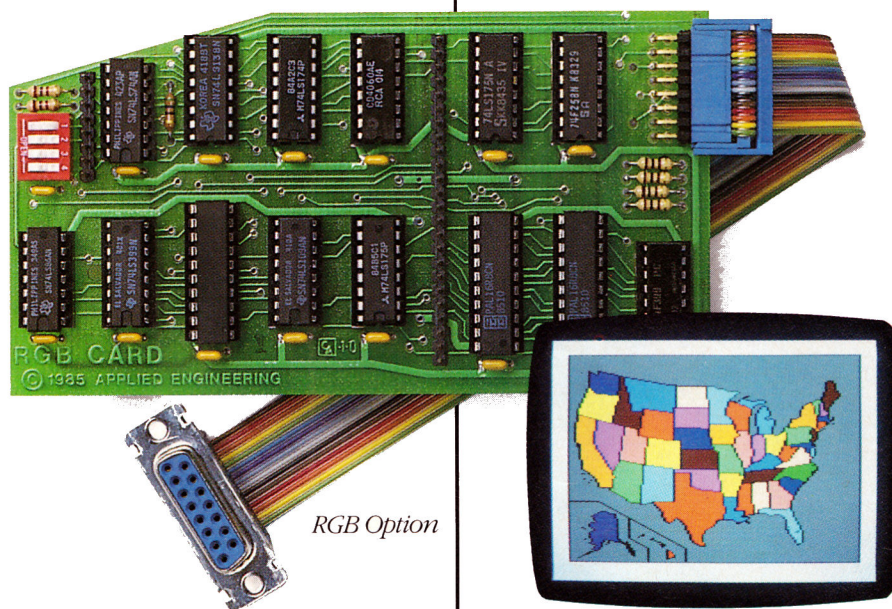
RamWorks II was designed so you could take full advantage of future developments in 16 and 32 bit microprocessors. As your needs grow, so can RamWorks II. A handy coprocessor connector allows the latest and greatest coprocessor cards to access all 3 MEG

of RamWorks II memory. And speaking of more memory, RamWorks II has a memory expansion connector on board so a low profile (no slot 1 interference) memory expansion card can add another 512K or 2 MEG of memory.

Should you ever run low on memory with RamWorks II (unlikely) you can add these expander cards to your RamWorks II at any time. And of course, these expander cards are compatible with original RamWorks too.

It's In Color.

The same slot that's used for memory expansion is also the slot that's used for RGB color display. RamWorks II lets you decide later to add RGB color. For only \$129, an RGB option can be added to RamWorks II to give you double high resolution color graphics and 80 column text. All with razor sharp, vivid brilliance that's unsurpassed in the industry. The RGB option does not waste another valuable slot, but rather plugs into the back of RamWorks II with no slot 1 interference (works on the original RamWorks, too) and attaches to any Apple compatible monitor. And remember. You can order the RGB



RGB Option

option with your RamWorks II. Or add it on at a later date.

It Corrects Mistakes.

Let's say you bought some other RAM card (and that's a mistake) and your RAM card is not being recognized by AppleWorks, Advanced Visicalc, Flashcalc, Supercalc 3A, or other programs, and you want RamWorks II.

No problem. The memory chips on the card that you now have, which is where most of the money is, can be unplugged and then plugged into the expansion sockets on RamWorks II.

It's Got It All.

- 15 Day Money Back Guarantee
- Super sharp 80 column text (patent pending) with or without RGB option
- Double high resolution graphics (with or without RGB option)
- Expandable up to 1 Meg (1024K) on main board

- Expandable to 3 Meg (3072K) with expander (piggyback) card
- Can use 64K or 256K RAMS in any combination
- Linear addressing coprocessor port
- Automatic AppleWorks expansion up to 2205K desktop
- Accelerates AppleWorks
- Built-in AppleWorks printer buffer
- The only large RAM card that's 100% compatible with all IIe software

512K Expander

2 MEG Expander

- RAMDRIVE™ the ultimate disk emulation software included free
- 16 Bit option
- Compatible RGB option
- Built-in self diagnostics software
- No slot 1 interference
- Lowest power consumption (patent pending)
- Takes only one slot
- Software industry standard
- Advanced Computer Aided Design
- Used by Apple Computer, Steve Wozniak and virtually all software companies
- 5 Year no hassle warranty

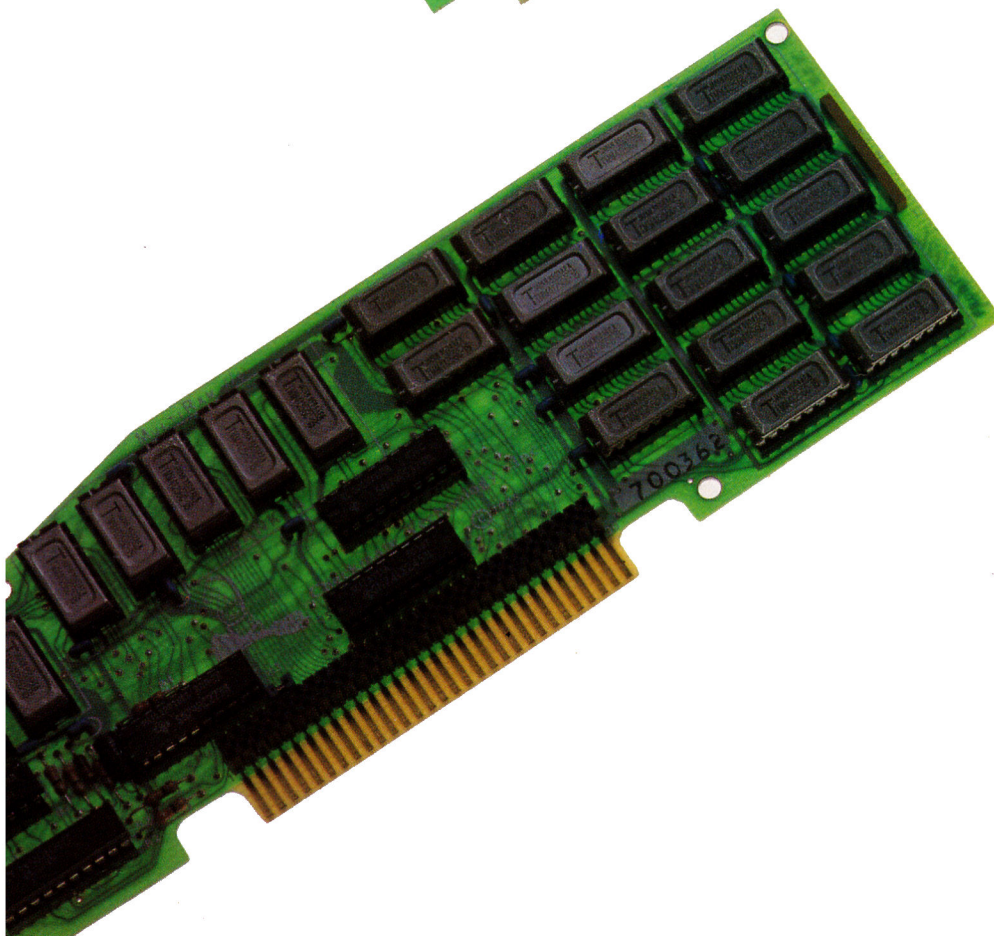
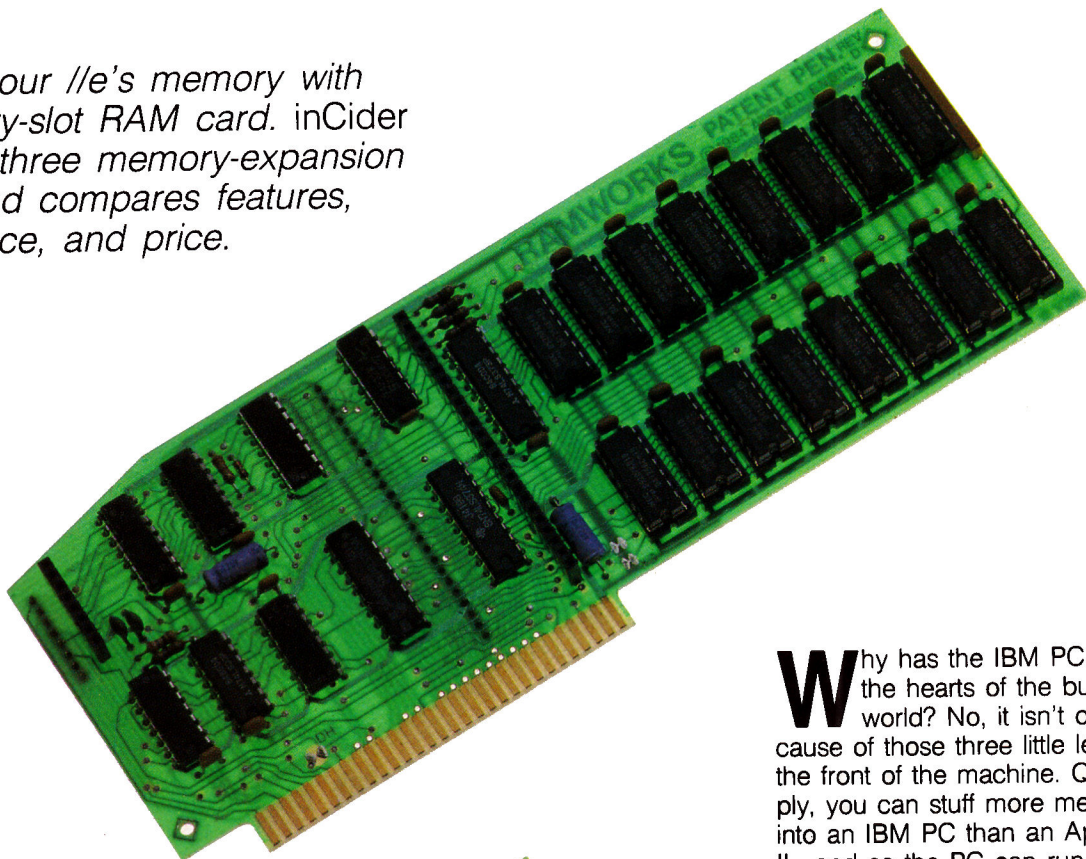
RamWorks II with 64K	\$ 179
RamWorks II with 256K	\$ 219
RamWorks II with 512K	\$ 269
RamWorks II with 1 MEG	\$ 389
RamWorks II with 1.5 MEG	\$ 549
RamWorks II with 3 MEG	\$1699
RGB Option (may add later)	\$ 129
16 Bit Option (may add later)	\$ 89

RamWorks II. Like the original, it's rather extraordinary. But then some things never change.

ORDER YOUR RamWorks II TODAY. 9 a.m. to 11 p.m. 7 Days, or send check or money order to Applied Engineering. MasterCard, Visa and C.O.D. welcome. Texas Residents add 5½% sales tax. Add \$10.00 outside U.S.A.

AE Applied Engineering
P.O. Box 798, Carrollton, TX 75006
(214) 241-6060

Improve your //e's memory with an auxiliary-slot RAM card. inCider evaluates three memory-expansion boards and compares features, performance, and price.



Why has the IBM PC won the hearts of the business world? No, it isn't only because of those three little letters on the front of the machine. Quite simply, you can stuff more memory into an IBM PC than an Apple II—and so the PC can run more powerful software than the Apple. But the Apple //e is now closing the “memory gap,” thanks largely to the three memory-expansion boards I’ll evaluate in this article: Applied Engineering’s RamWorks II, Checkmate Technology’s MultiRam //e, and the E’ Card from Legend Industries.

These RAM cards slip into the auxiliary slot of the //e. There they have direct access to the machine’s video circuitry and firmware, and, more importantly, they can take advantage of the bank-switching scheme built into the //e. Bank-switching lets the //e overcome the most serious deficiency of the Apple’s microprocessor—its 16-bit address bus.

Magic Bus

What’s wrong with 16 bits? Nothing, if you’re talking about the number of data bits a microprocessor can handle. A 16-bit

THANKS FOR THE MEMORY

by Bob Ryan, *inCider* Technical Editor

address bus, though, can access only 65,536 bytes (64K) of memory at one time. The IBM PC has a 20-bit address bus, circumventing the 64K memory restriction. The Apple //e and //c get around the 64K limit of the 6502 family by alternately accessing different 64K banks of memory (hence the term "bank switching"). Bank switching is neither as efficient nor as easy to implement as direct addressing, but, in conjunction with the right memory board, it can turn your Apple into a powerful business machine—one that can run complex, memory-hungry software.

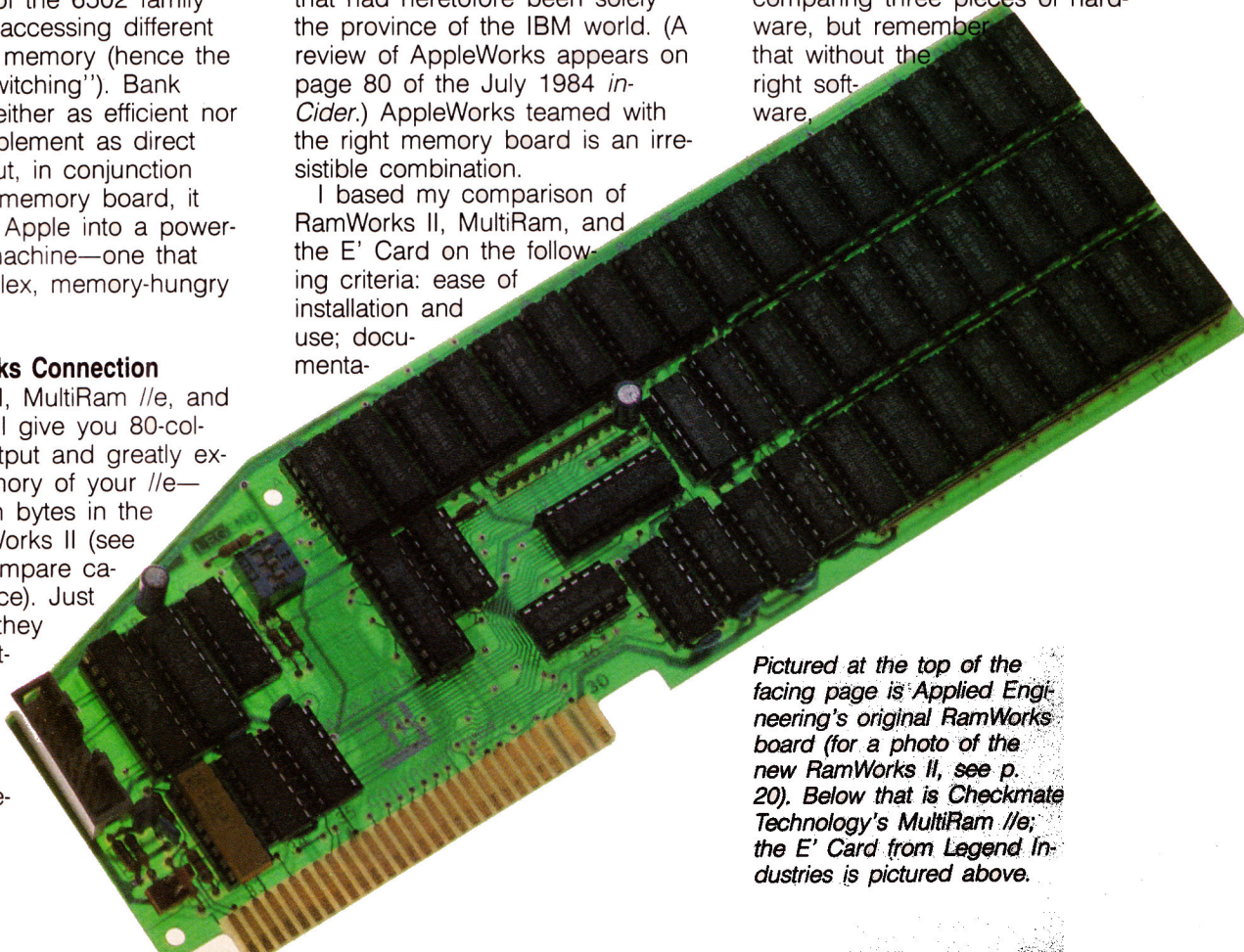
The AppleWorks Connection

RamWorks II, MultiRam //e, and the E' Card all give you 80-column video output and greatly expand the memory of your //e—up to 3 million bytes in the case of RamWorks II (see **Table 1** to compare capacity and price). Just as important, they come with software that lets AppleWorks—the most popular package among serious Apple

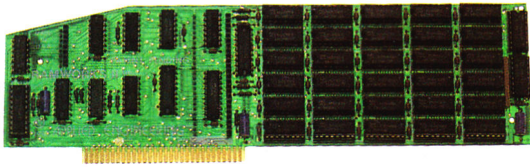
users—take advantage of all that extra memory. AppleWorks incorporates a data-base manager, spreadsheet, and word processor in one package, thereby giving Apple users the kind of power that had heretofore been solely the province of the IBM world. (A review of AppleWorks appears on page 80 of the July 1984 *inCider*.) AppleWorks teamed with the right memory board is an irresistible combination.

I based my comparison of RamWorks II, MultiRam, and the E' Card on the following criteria: ease of installation and use; documentation

and support; performance; and—of critical importance—compatibility with AppleWorks (see **Table 2** for a summary of the evaluation). It may seem strange to give such weight to software in comparing three pieces of hardware, but remember that without the right software,



Pictured at the top of the facing page is Applied Engineering's original RamWorks board (for a photo of the new RamWorks II, see p. 20). Below that is Checkmate Technology's MultiRam //e; the E' Card from Legend Industries is pictured above.



Applied Engineering's RamWorks II card

the most impressive piece of hardware is just so much silicon and plastic.

Installation and Use

As mentioned above, each of these boards fits into the auxiliary slot of the //e. In each case, the installation process is easy—it's impossible to put these boards in backwards. Plugging in the E'

Card is a little more involved because its standard version comes with two features that are optional or not available on the other cards—RGB color output and 16-level grey-monochrome output. You must attach two cables to the E' Card to access these features—but that's simple to perform.

Once you've installed these

boards, you won't have to touch them again. All three use the //e's 80-column firmware, so software written for Apple 80-column cards works with these boards. If you do any program development, though, MultiRam has a slight advantage over the other two boards: four LEDs that let you see which bank of memory the microprocessor is currently addressing.

Documentation and Support

Without doubt, MultiRam comes with the best documentation. The manual contains just about all you'll ever need to know about the card and its operation, including how to program the card, how to manually segment large AppleWorks files, and how to get the most out of your Apple system. It's beautifully organized and well written—all in all, one of the better manuals I've seen.

Support for MultiRam is also exceptional. The package includes a five-year warranty you can extend for another five years for an additional \$25. Registered owners can call Checkmate Technology's help line during business hours for the cost of the phone call.

The RamWorks II documentation is very good, but not as complete as MultiRam's. Much of the material on the operation of Applied Engineering's AppleWorks expansion software is found not in the manual, but on the disk itself. This arrangement is bothersome if, for example, you forget how an AppleWorks file is segmented and need that information quickly. I want documentation I can hold in my hand.

Like Checkmate, Applied Engineering now offers a five-year warranty on its board. It also provides free telephone help. In the past, Applied Engineering has restricted its support to those people who purchased their RamWorks boards directly from Applied or from an authorized dealer. Reportedly, this qualification no longer applies.

Of the three cards, Legend's

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Table 1. RAM capacities and prices of three memory-expansion boards.

Capacity	E' Card	MultiRam //e	RamWorks II
64K	\$299	\$159.95	\$179
256K	\$419	\$289.95	\$249
512K	\$519	\$359.95	\$319
768K	\$644	\$429.95	NA
1M	\$769	NA	\$519
1.5M	NA	NA	\$719
3M	NA	NA	\$1699

Note: Chip prices are constantly falling. Check with the manufacturer for the latest prices.

NA indicates that the manufacturer does not make the specified memory board.

E' Card has the poorest documentation. Although it contains a complete section on installing the card, much of the text is repetitious. Also, the documentation doesn't explain how to segment large AppleWorks files over multiple data disks. What good is having a 300K data-base file if you can't save it to your 140K Apple disks?

Performance

To check on the speed of the hardware and the efficiency of the AppleWorks expansion software, I created a 180K AppleWorks spreadsheet and kept track of the time it took each card, running its own software, to recalculate the spreadsheet. I used simple $N = N + 1$ formulas throughout the spreadsheet. **Table 3** shows the results of this test. The E' Card and software enjoys a small speed advantage over the other two boards. RamWorks II and MultiRam exhibited virtually the same performance.

The quality of the 80-column display is similar for all three boards—not surprising, since they all use the //e's 80-column firmware. The RGB output of the three cards varies, though. The E' Card uses a different RGB scheme from that of the Apple RGB interface, which I see as the *de facto* standard for Apple II computers. Consequently, you sometimes get strange results

when you run double-hi-res graphics software with the E' Card.

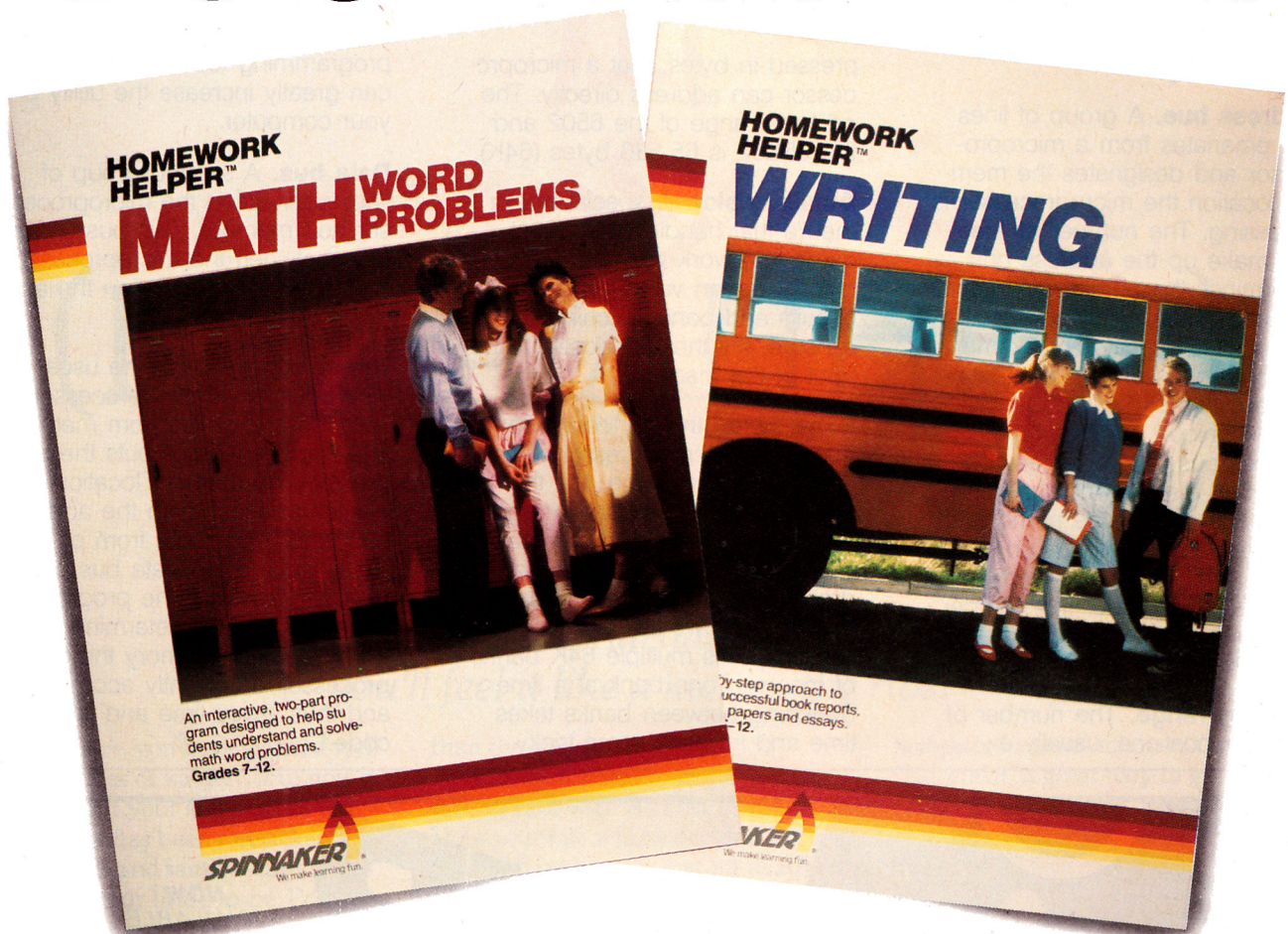
On the plus side, the E' Card offers 16-level grey video output. This feature greatly enhanced the quality of graphics on a monochrome monitor. Sixteen-level grey output is not available on RamWorks II or MultiRam.

AppleWorks Compatibility

The software that comes with these cards modifies AppleWorks to take advantage of the extra memory the cards provide. The size of the AppleWorks files you create depends on the amount of memory on your expansion card. All three cards alter AppleWorks so that it can handle large files. They also let you load most of the AppleWorks program into memory, thereby cutting down on disk-access time while you're running it. The only drawback to putting most of AppleWorks into memory is that the program then takes a couple of minutes to boot. RamWorks II and MultiRam offer this AppleWorks acceleration as an easily accessible option. This feature is standard with the E' Card.

Beyond file expansion and program acceleration, there are huge differences among the AppleWorks-modifying programs sold with the cards. Without doubt,

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Glossary

Address bus. A group of lines that emanates from a microprocessor and designates the memory location the microprocessor is accessing. The number of lines that make up the address bus determines the number of memory locations a microprocessor can access directly. For example, a microprocessor with a 16-bit address bus can put one of 65,536 unique numbers on its address bus (2^{16}) to access one of 65,536 discrete memory locations. The greater the number of lines in the address bus (in other words, the greater the width of the bus), the greater the number of individual memory locations the bus can define and access.

Address range. The number of memory locations, usually ex-

pressed in bytes, that a microprocessor can address directly. The address range of the 6502 and the 65C02 is 65,536 bytes (64K).

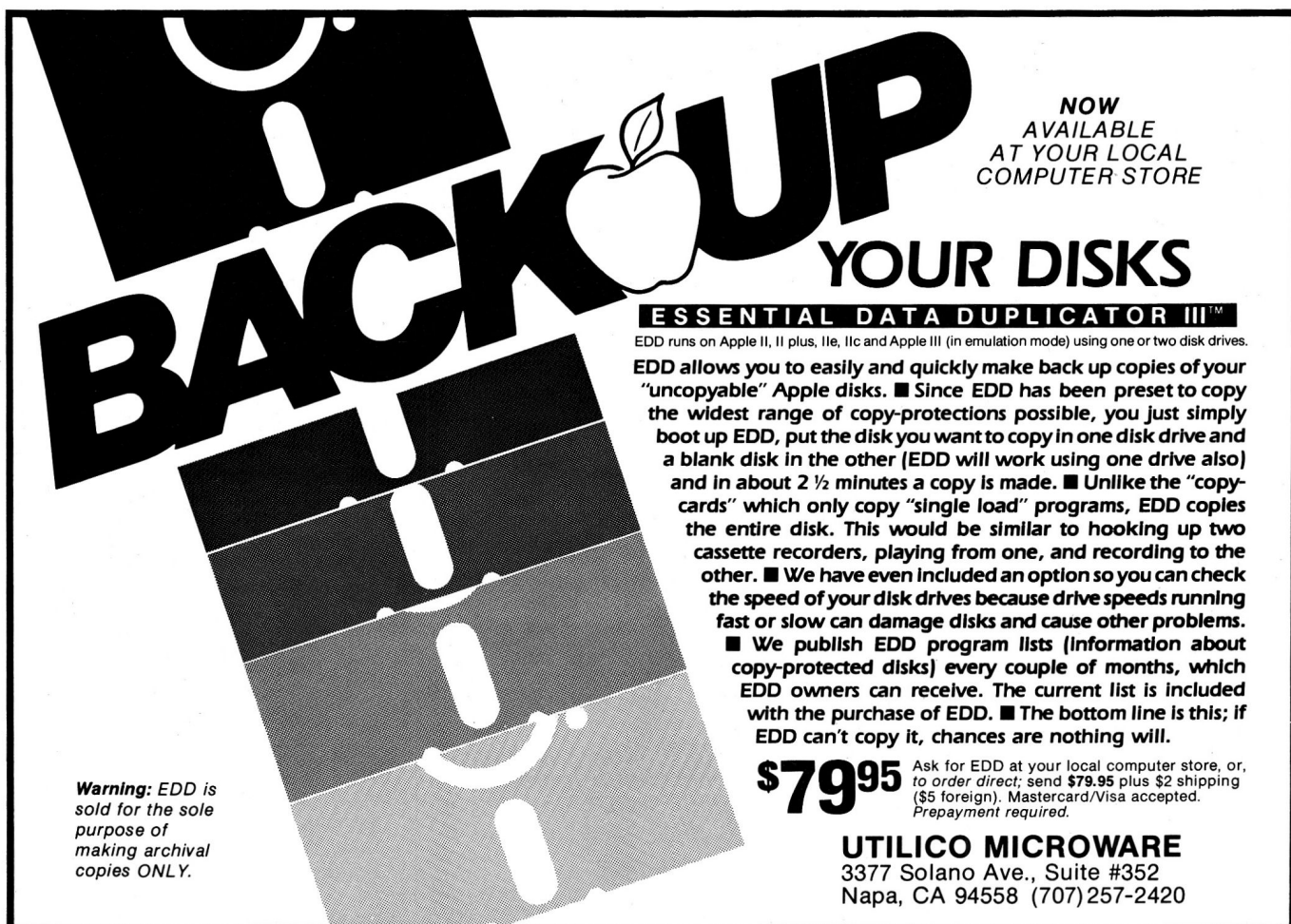
Auxiliary slot. A special slot in the //e that handles peripheral cards that work with the machine's built-in video-generation circuits and bank-switching scheme. It's the slot closest to the front of the machine.

Bank switching. A technique that lets a microprocessor with a limited address range, like the 6502 (or 65C02), address large amounts of memory. In the case of the 6502, which has an address range of 64K bytes, bank switching allows the microprocessor to access multiple 64K banks of memory, one bank at a time. Switching between banks takes time and involves some tricky

programming techniques, but it can greatly increase the utility of your computer.

Data bus. A second group of lines connecting the microprocessor and memory. This bus carries data between the microprocessor and the memory location the address bus defines.

Direct addressing. The usual way in which a microprocessor reads to and writes from memory. The microprocessor puts the address of the memory location it wants to access onto the address bus, and reads data from or writes data to the data bus. With direct addressing, the program does not have to determine which bank of memory the microprocessor is currently accessing, and thus saves time and lines of code. □ —R.R.



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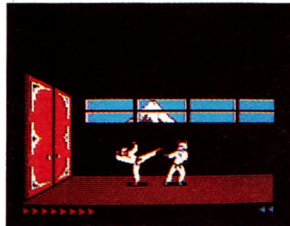
KARATEKA, you have learned well the disciplines of karate...but now it is time to put your skills to the test. Your village has been ransacked, your friends and family scattered to the winds, your bride-to-be, Princess Mariko, kidnapped and cruelly imprisoned by the evil warlord Akuma. If you ever hope to see her again, Karateka, you know what you must do.

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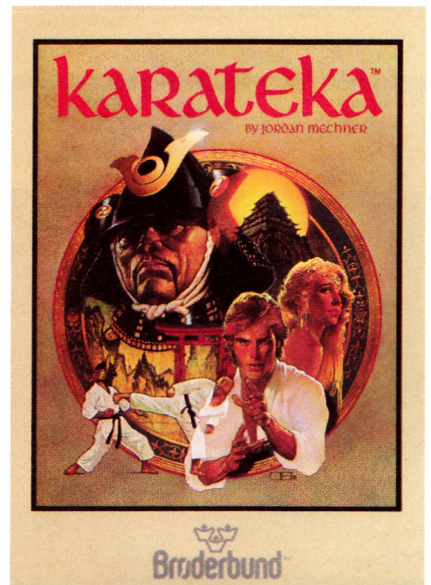


for realism. He used film clips of karate masters as a guide for the moves used in the game.

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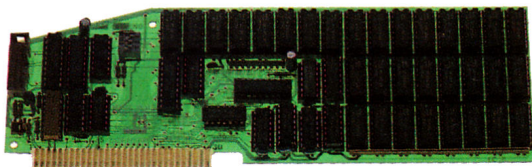
Beautiful scrolling, hi-res backgrounds, an intricate story line and

fast-paced karate action make "Karateka" a great way to get your kicks.




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Legend's E' Card

Table 2. Comparison chart for three auxiliary-slot RAM cards.

Product	Features						Evaluation				
	Max. Memory	RGB Output	16-Level Grey Output	16-Bit CPU Connector	AppleWorks Expansion	RAM-Disk Software	Ease of Installation and Use	Documentation and Support	Performance (see Table 1)	AppleWorks Compatibility	Rating
E' Card	1M	std	std	NA	std	std	good	poor	good	fair	**
MultiRam II/e	768K*	NA*	NA*	std**	std	std	good	excellent	good	fair	***
RamWorks II	3M	\$129	NA	std	std	\$29	good	good	good	excellent	****

* An additional 768K, along with RGB and 16-level video output, should be available for MultiRam by the time this review appears.

** A G5816 board is now available from Checkmate Technologies. See page 52.

std = standard NA = not available

RamWorks II is the most powerful. Among other advantages, it increases the number of files on the desktop to 36, the number of data-base records to 5100, and the number of lines in the word processor to 5100. Most importantly, it automatically segments AppleWorks files that exceed the capacity of your disk drives. Neither the E' Card nor MultiRam currently expands these areas of AppleWorks, although both Legend Industries and Checkmate Technology promise updated soft-

ware in the future.

AppleWorks is not the only package that can utilize the additional memory these expansion boards furnish. The list of supported software is small, but growing. Applied Engineering sells a pre-boot program for \$29 that lets VisiCalc use RamWorks II's extra memory. Checkmate Technology lists VisiCorp's FlashCalc and Artsci's MagiCalc and Magic Office System as three programs that can employ some of the MultiRam memory without modifi-

cation. The bank-switching method Apple's II RAM Expansion Card uses is not compatible with the technique employed by auxiliary-slot boards (see the accompanying sidebar, along with "Apple Announces New Products That Dazzle, New Enhancements That Perform" in the November 1985 issue, p. 12), and this may limit the number of software titles that take advantage of the extended-memory cards reviewed here.

In addition to AppleWorks expansion, Legend Industries and

New Card on the Block

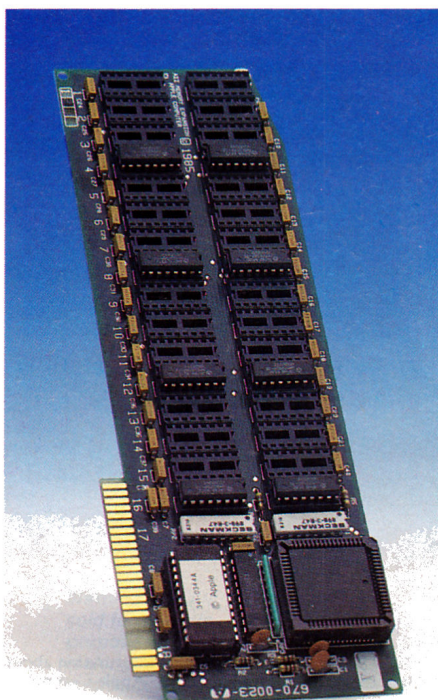
The technology that drives Apple Computer's recently introduced peripheral-slot Apple II RAM Expansion Card represents a radical departure from the operation of the auxiliary-slot memory boards featured in the accompanying review. The II RAM contains all the hardware and firmware your computer needs to implement bank switching. Consequently, it works in the Apple II and II Plus, in addition to the II/e.

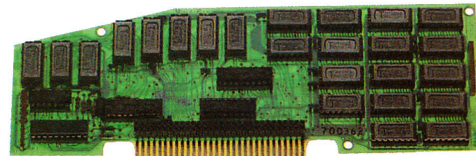
Software that takes advantage of the extra memory a II RAM board provides does not necessarily recognize the memory an auxiliary-slot card supplies. This does not mean, however, that the auxiliary-slot cards are obsolete. What it does mean is that you will have to make some hard decisions before purchasing any memory-expansion board for your Apple.

If you are primarily interested in

extending AppleWorks, don't worry too much about the Apple II RAM Expansion Card. The auxiliary-slot cards will give you all the capability you need. In fact, Greg Hastings of Pinpoint Publishers, makers of the new Pinpoint AppleWorks accessories package, told *inCider* that he is working with the auxiliary-slot-board manufacturers to ensure that the initial release of Pinpoint will work with their boards.

Down the road, the II RAM Expansion Card will have more support from third-party software vendors than the auxiliary-slot cards. If your major application is not AppleWorks, you should wait until the II RAM Expansion Card becomes available (probably early '86) before you decide which card is best for you. *inCider* will review the II RAM Expansion Card as soon as production models are available. □ —R.R.





Checkmate Technology provide software that converts their cards to RAM disks. Applied Engineering charges you extra for comparable software. I checked out the three RAM-disk software packages and was satisfied with the performance of each. I didn't test the RAM-disk software extensively because I frankly don't find RAM disks particularly useful.

Conclusion

In conjunction with its AppleWorks-expansion software, RamWorks II is the most powerful auxiliary-slot memory card available for your //e, and I rate it four stars. MultiRam and the E' Card are both fine products, but neither is currently as useful or as capable as RamWorks II. MultiRam gets three stars, and the E' Card, primarily because of its poor documentation, two. For my money, Applied Engineering's RamWorks II is king of the hill. ■

Product Information

E' Card

Legend Industries
Industrial Computer Division
2220 Scott Lake Road
Pontiac, MI 48054
(313) 674-0953

Reader Service Number 305

MultiRam //e

Checkmate Technology
509 South Rockford Drive
Tempe, AZ 85281
(602) 966-5802

Reader Service Number 306

RamWorks II

Applied Engineering
P.O. Box 798
Carrollton, TX 75006
(214) 241-6060

Reader Service Number 307

Note: See Table 1 for prices.

Table 3. Speed check on a 5994-cell spreadsheet composed of the formula $N = N + 1$.

Memory Board	Recalculation Time (average of three recalculations)
E' Card	83.95 seconds
MultiRam //e	84.62 seconds
RamWorks II	84.51 seconds

Note: Since timings were done by hand, the difference between MultiRam and RamWorks II is not significant. The E' Card shows a 0.6 percent performance advantage over both MultiRam and RamWorks II.

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Since there's more than one way for a computer to sort data, I'll introduce you to the techniques of five sorting algorithms. Then you can type in the accompanying **Program Listing** (p. 33) to see these algorithms displayed on your computer screen in lo-res (low-resolution) graphics.

Quicksort

A simple but effective sorting algorithm, Quicksort was conceived

by Professor C.A.R. Hoare even before he had a computer language advanced enough to use it. Quicksort's underlying strategy is to choose a pivotal value—typically the value of some item in the list—that divides the list into two shorter lists. Items are exchanged two at a time; those too large for the first part are exchanged with items too small for the second part until all items less than the pivotal value are in the first part, and all items greater in the second.

Then you choose a pivotal value for each of these two lists (and all subsequent sublists) and repeat the process. If you're lucky and pick as pivotal value the item that belongs exactly in the middle, the sort will speed along at maximum efficiency. While choosing a proper pivotal value and keeping track of

all the sublists are complicated tasks, Quicksort, in general, lives up to its name. It performs best on scrambled lists, and, curiously enough, worst when an input list is already in order.

Shellsort

Quicksort didn't develop in a vacuum. Some years earlier, D.A. Shell had worked out a sorting technique that also uses remote testing and moving. He observed that comparing only adjacent items slows a sort down since the number of items to be sorted actually increases in the process. Shell's insight was to compare items some distance apart and exchange them whenever they were out of order. Both items jump several positions—usually much closer to their final destinations.

*Illustrations are actual enlarged
screen displays of unsorted (top)
and sorted (bottom) color bars.*

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An Apple IIc



An Apple IIc with Z-RAM

The Apple IIc on the right works exactly the same as the Apple IIc on the left. Almost. The Apple on the right has a powerful memory expansion coprocessing card called Z-RAM. From Applied Engineering. Which means the Apple on the right can completely load AppleWorks into RAM—and then run it up to thirty times faster than the Apple on the left.

Z-RAM also acts as a solid-state disk drive. Which means the Apple on the right will load and store programs up to 30 times faster. And, our included RAM disk is compatible with Applesoft, PRO-DOS, DOS 3.3, PASCAL and CP/M.

Turbo Charged AppleWorks.

Even a 256K Z-RAM can completely load AppleWorks into RAM. With Z-RAM, the moment your fingers touch the keyboard AppleWorks responds. A 256K Z-RAM lets your IIc run AppleWorks up to 30 times faster, increases available desktop to 235K and maximum number of records from 1,350 to over 16,000, doubles the number of lines allowed in the word processor, provides a print spooler, and auto-segments large files so they can be saved on two or more disks. A 512K Z-RAM boosts AppleWorks desktop to an incredible 425K.

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There's more. Z-RAM has a built-in high speed Z-80B microprocessor that allows you to run CP/M programs. Which means you now have access to the single largest body of software in existence, including popular packages like WordStar, dBase II, Turbo PASCAL and Microsoft BASIC. A 16 bit option is also available.

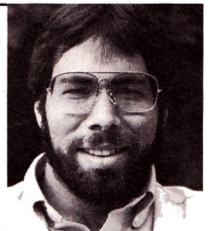
And still more. Z-RAM is compatible with all IIc software and hardware, installs easily in just ten minutes with a screwdriver (slightly longer without), is available with 256K or 512K of additional memory (a 256K Z-RAM can be upgraded to 512K at

any time). Z-RAM is easily handled by the IIc power supply with our patent pending power saving design.

The only thing better than that would be a recommendation from Steve Wozniak.

"I recommend Applied Engineering products wholeheartedly." (Of course, Steve's IIc has a Z-RAM installed.)

Steve Wozniak, the creator of Apple Computer

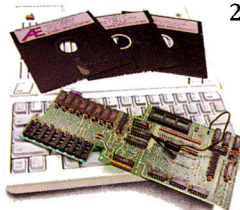


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Z-RAM comes complete with simple instructions, RAM disk software, Z-80 operating system, CP/M manual. And a five year "hassle free" warranty. Make a good Apple great. With 256K Z-RAM "384K total" (\$359); with 512K "640K total" (\$419); 16 bit option may be added later (\$89).

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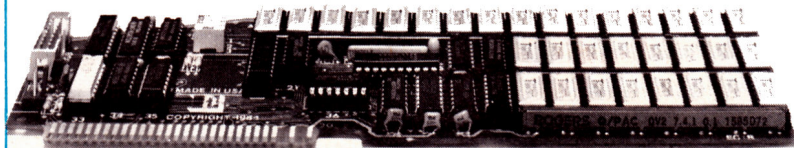
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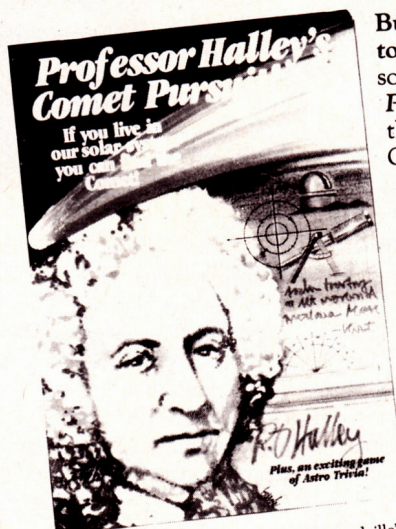
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The Shellsort technique compares the first item in the list with an item a certain distance away—the distance determined by an offset value you choose—and, whenever it's necessary, exchanges the items. What saves time is that in the early passes fewer comparisons are made. Some needed exchanges are overlooked at that time, of course, but the exchanges that do occur move the items closer to where they belong.

With each pass through the list, the offset is decremented. This process is repeated until the offset is one; only then will adjacent items be compared and exchanged. The advantage of Shell's method is that the list is nearly sorted before you compare adjacent items.

Shellsort calculates the offset on the basis of the number of items in the list and not the value of any item (as with Quicksort), thus reducing the overhead of keeping track of all sublists. You may be concerned with how best to choose the pivotal value. But remember also that if you spend too much time trying to find a good value, you'll slow the sort down.

Insertion Sort

An insertion sort creates a new, sorted list from an old, unsorted list. It takes one item at a time from the unsorted list and inserts it into its proper position in the sorted list—until all items are sorted. Thus, there can be no final output until all input is complete.

Finding the position for insertion can be complicated; I chose the simplest technique to program. As each unsorted item is tested, the higher items in the sorted list are moved over to make room. This wastes little time on sorted input; each presorted item comes in where it belongs, and so is inserted with a minimum of comparisons.

An insertion sort works well on relatively short lists. For a dozen items, this simple technique could be your first choice. With hundreds

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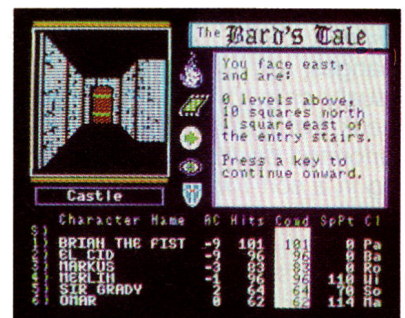
are magic, the Bard is ready to boogie. All he needs is a band of loyal followers: a light-fingered rogue to find secret doors, a couple of fighters to bash heads, a conjurer to create weird allies, a magician for magic armor. Then it's off to combat, as soon as the Bard finishes one more verse. Now what's a word that rhymes with "dead ogre?"



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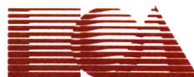


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of items to sort, though, an insertion sort can be slow because it must compare numerous adjacent items to find the proper position for each item. Even then, its simplicity can make it attractive.

Selection Sort

A selection sort also creates a new list from an old one. It scans the entire list to find the first item for the new list, then scans the rest of the list to find the next item, and so on until all items are sorted.

A selection sort differs from an insertion sort in that all of the input is scanned before anything is output; once an item is ready for output, it's not needed again. These differences are muted in the demo program because all input is completed before any of the sorts start.

Exchange Sort

In its simplest form, an exchange sort is a brute-force technique that compares adjacent items and exchanges those out of order. That may sound like a speedy method—just once through and it's done—until you realize that there's no guarantee that the job is complete. Subsequent passes are necessary to make additional exchanges, and some indicator (usually called a flag) is needed to check that no exchanges were performed on the final pass. This flag in a sort routine is a giveaway that the sort algorithm is the notorious bubble sort.

Bubble sort is so slow because every time through it checks each item with the one following—it's comparing not only adjacent items but all items. Additionally, the number of comparisons is reduced by only one for each pass. Yet, in spite of its known deficiencies, people continue to use this sort. One excuse is that it works fairly well on sorted input. Think about that for a minute: If you don't need a sort, a bubble sort will work.

If you ever want to revise a program that has a bubble sort in it, remember Shell. A few simple changes and additions to the code should produce a dramatic increase in efficiency.

A Graphic Demonstration

To observe the sorts in action, run my demo program. Each sort rearranges a pattern of stripes (in various colors if you have a color

monitor) in numerical order according to the logic of Apple lo-res graphics. "Darker" colors move leftward, "lighter" colors, rightward. For purposes of comparison, the initial pattern remains at the bottom of the display. Each sorting algorithm beeps when it starts and again when it finishes, so you can time it.

You can select one pattern and observe how each algorithm sorts it, or one algorithm and observe how it sorts several different patterns. The pattern is arbitrary up to a point—actually, up to a line. In each pattern, the rightmost stripe will always be color 15 (white). This upper bound makes the algorithms more efficient. An important part of the instructions is to know when to stop. If the rightmost item is the biggest item, then testing for the right end of the list is simplified. Bear this in mind if you want to use these subroutines in a different program.

Programming Notes

The procedure I used to choose the Shellsort offset comes from Knuth (see "Further Reading") and encodes the sequence 1, 4, 13, 40, 121, 364, 1093. . . $(3^k - 1)/2$. This sequence of offsets should prove useful if you want to adapt the subroutine to other tasks.

The Shellsort can also be adapted to other sorts. For example, Knuth adopts Shell's method to increase the speed of the insertion sort, and I've followed Dwyer and Critchfield in applying Shell's method to the exchange sort. Additionally, I've improved slightly on the simplest form of the bubble sort. Following Knuth, I made the value of BOUND depend on the value of FLAG such that items occurring later in the list than the last exchange are ignored on subsequent passes. Even so, I think you'll soon find this algorithm unsatisfactory. ■

Address correspondence to Peter Lincoln at 3905 Niele Place, Honolulu, HI 96816.

Further Reading

In programming the algorithms, I've largely followed the techniques presented in *BASIC and the Personal Computer* by T.A. Dwyer and M. Critchfield (Addison-Wesley, 1978). Their explanations of sorting (and other topics) are an excellent starting place for further study.

The best reference book on sorting is *The Art of Computer Programming Vol. 3: Sorting and Searching* by D.E. Knuth (Addison-Wesley, 1973). Don't let the highly mathematical portions keep you from discovering Knuth's rich style and his command of technical facts.

Algorithms + Data Structures = Programs by N. Wirth (Prentice-Hall, 1976) contains an excellent discussion of sorting techniques aimed at Pascal programmers. If you don't use Pascal, don't let that bother you. Wirth himself, though an author of Pascal, has moved on to another of his languages.

In "The Emperor's Old Clothes" (originally in *Communications of the Association for Computing Machinery*, February 1981; reprinted in *Byte*, September 1981, pp. 414-425), Professor C.A.R. Hoare talks eloquently about sorts, computer languages, and other matters and tells of some personal experiences that led up to the 1980 ACM Turing Award.

In *Sorting and Sort Systems* by Harold Lorin (Addison-Wesley, 1975), the approach is deliberately less technical than Knuth's. On the other hand, it does include reprints of the original ALGOL statement of many famous sort techniques. □

—P.C.L.

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The ColorMonitor IIe on a IIe.



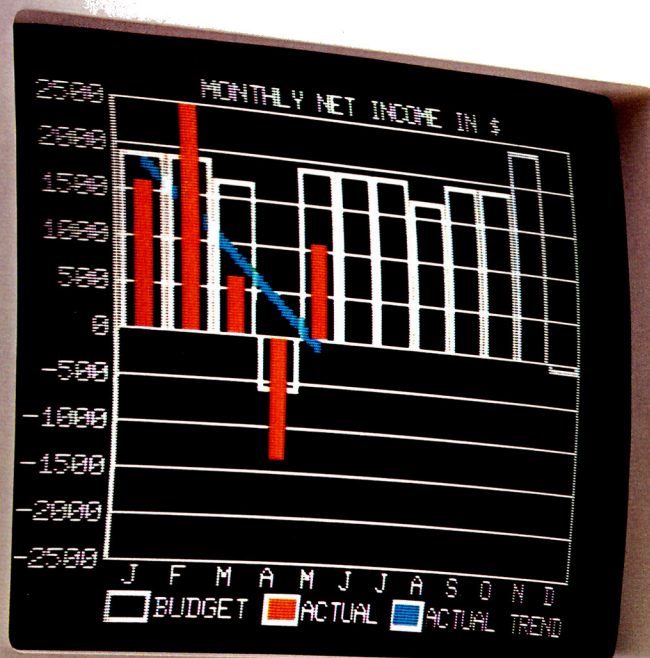
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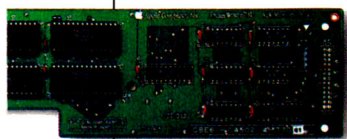
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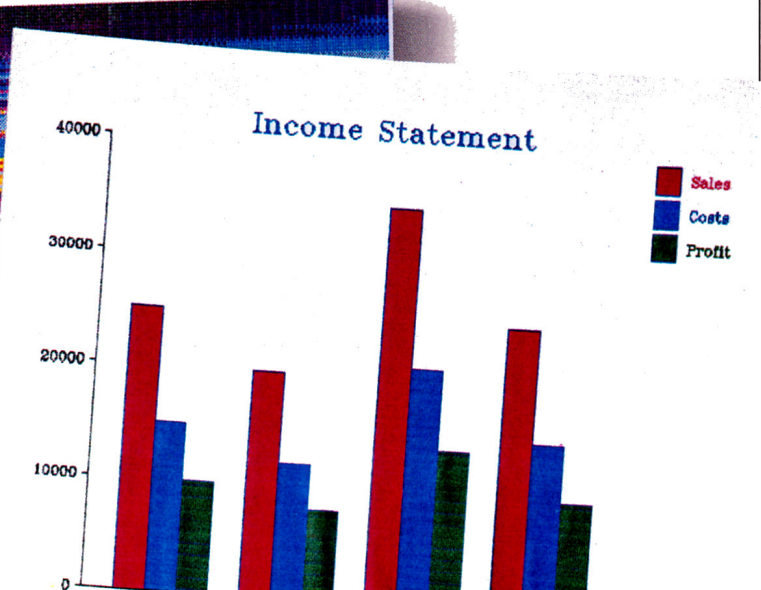
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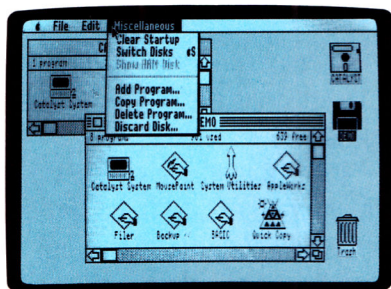


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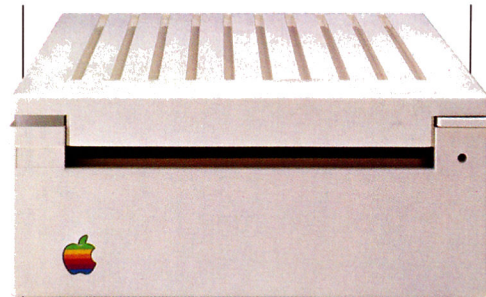
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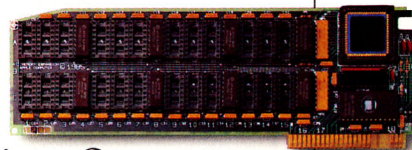
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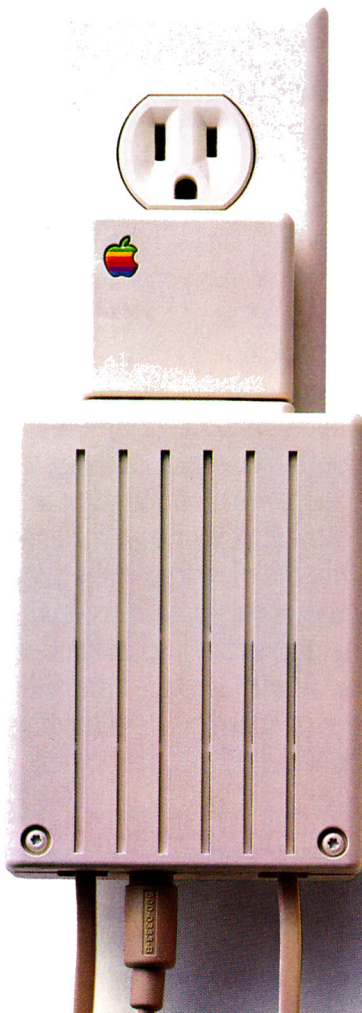
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Program listing. Screen-sort demo program.

```

100 REM SCREEN SORT DEMO PROGRAM
105 REM BY P.C. LINCOLN
110 REM AUGUST 1983
115 :
116 REM INITIALIZE
117 :
120 N = 40: REM COLUMNS TO SORT
121 :
130 DIM A(N): REM HOLD PATTERN
131 :
140 DIM L(N / 2),R(N / 2): REM FOR QUICKSORT POINTERS
141 :
150 Y = 0: REM POINT TO TOP OF STRIPE
179 :
180 GOTO 300
197 :
198 REM PAINT SCREEN
199 :
200 HOME
210 FOR X = 0 TO 38
220 COLOR = A(X + 1)
230 VLIN 0,14 AT X
240 NEXT
241 :
245 REM RIGHTMOST IS MAXIMUM FOR SENTINEL
248 :
250 COLOR = 15
260 VLIN 0,14 AT 39
270 RETURN
299 :
300 GOSUB 9000: REM INSTRUCTIONS
301 :
310 GOSUB 500: REM NEW PATTERN
311 :
320 GOSUB 200: REM PAINT IT
321 :
400 VTAB 22: PRINT "1 QUICK, 2 SHELL, 3 INSERTION"
410 VTAB 23: PRINT "4 SELECTION, 5 EXCHANGE,
6 NEW, 0 EXIT"
415 GET Z$: IF Z$ < "0" OR Z$ > "6" THEN 400
416 ZZ = VAL (Z$)
420 IF ZZ = 0 THEN TEXT : HOME : END
430 IF ZZ = 6 THEN GOSUB 500
440 GOSUB 200
444 REM REPLACE LINES 450 AND 470 WITH CALL
TIME ROUTINES IF YOU CAN
450 PRINT CHR$ (7): REM BEEP BEGIN
460 ON ZZ GOSUB 1000,5000,2000,4000,3000
470 PRINT CHR$ (7): REM BEEP FINISH SORT
480 GOTO 400
497 :
498 REM CREATE PATTERN IN A()
499 :
500 FOR X = 0 TO N
510 A(X) = INT ( RND (1) * 16)
520 NEXT
530 HOME : GR : REM CLEAN SCREEN
540 RETURN
550 :
900 END

```

Listing continued.

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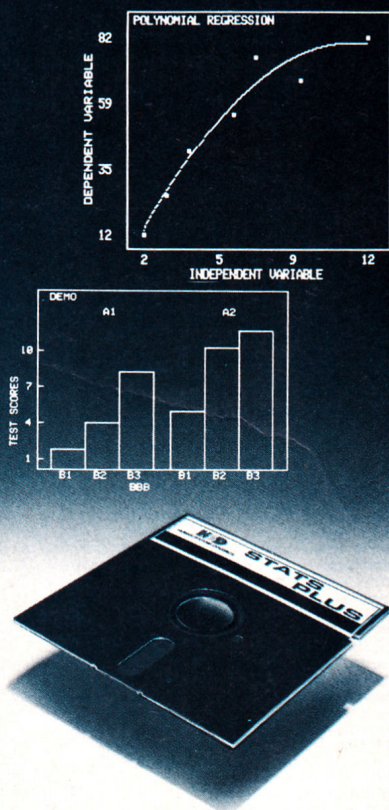
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Listing continued.

```

999 :
1000 PRINT "QUICKSORT"
1100 L = 0:R = 38:SP = 0
1200 I = L:J = R + 1:K = SCRN( L,Y)
1300 I = I + 1: IF SCRN( I,Y) < K THEN 1300
1400 J = J - 1: IF SCRN( J,Y) > K THEN 1400
1500 IF I > J THEN 1600
1510 CI = SCRN( I,Y)
1520 COLOR = SCRN( J,Y)
1530 VLIN 0,10 AT I
1540 COLOR = CI
1550 VLIN 0,10 AT J
1560 GOTO 1300
1600 COLOR = SCRN( J,Y)
1610 VLIN 0,10 AT L
1620 COLOR = K
1630 VLIN 0,10 AT J
1700 IF J - L > = R - I THEN 1750
1710 IF I > = R THEN 1730
1720 SP = SP + 1:R(SP) = R:L(SP) = I
1730 R = J
1740 GOTO 1780
1750 IF L > = J THEN 1800
1760 SP = SP + 1:R(SP) = J:L(SP) = L
1770 L = I
1780 IF R > L THEN 1200
1800 IF SP = 0 THEN RETURN
1810 R = R(SP):L = L(SP):SP = SP - 1
1820 GOTO 1200
1999 :
2000 PRINT "INSERTION SORT"
2100 FOR J = 1 TO 38
2200 I = J - 1
2210 K = SCRN( J,Y)
2300 IF K > = SCRN( I,Y) THEN 2500
2400 COLOR = SCRN( I,Y)
2410 VLIN 0,10 AT I + 1
2420 I = I - 1
2430 IF I > = 0 THEN 2300
2500 COLOR = K
2510 VLIN 0,10 AT I + 1
2599 NEXT J
2600 RETURN
2999 :
3000 PRINT "BUBBLE SORT"
3100 BOUND = 38
3200 FLAG = 0
3210 FOR J = 0 TO BOUND - 1
3300 IF SCRN( J,Y) < = SCRN( J + 1,Y) THEN 3390
3310 CI = SCRN( J,Y)
3320 COLOR = SCRN( J + 1,Y)
3330 VLIN 0,10 AT J
3340 COLOR = CI
3350 VLIN 0,10 AT J + 1
3360 FLAG = J
3390 NEXT
3400 IF FLAG = 0 THEN RETURN
3410 BOUND = FLAG
3420 GOTO 3200
3999 :
4000 PRINT "SELECTION SORT"
4100 FOR J = 0 TO 37
    
```

Listing continued.

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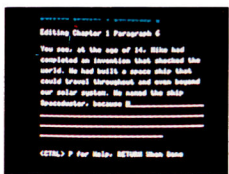
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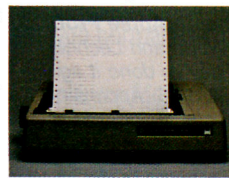
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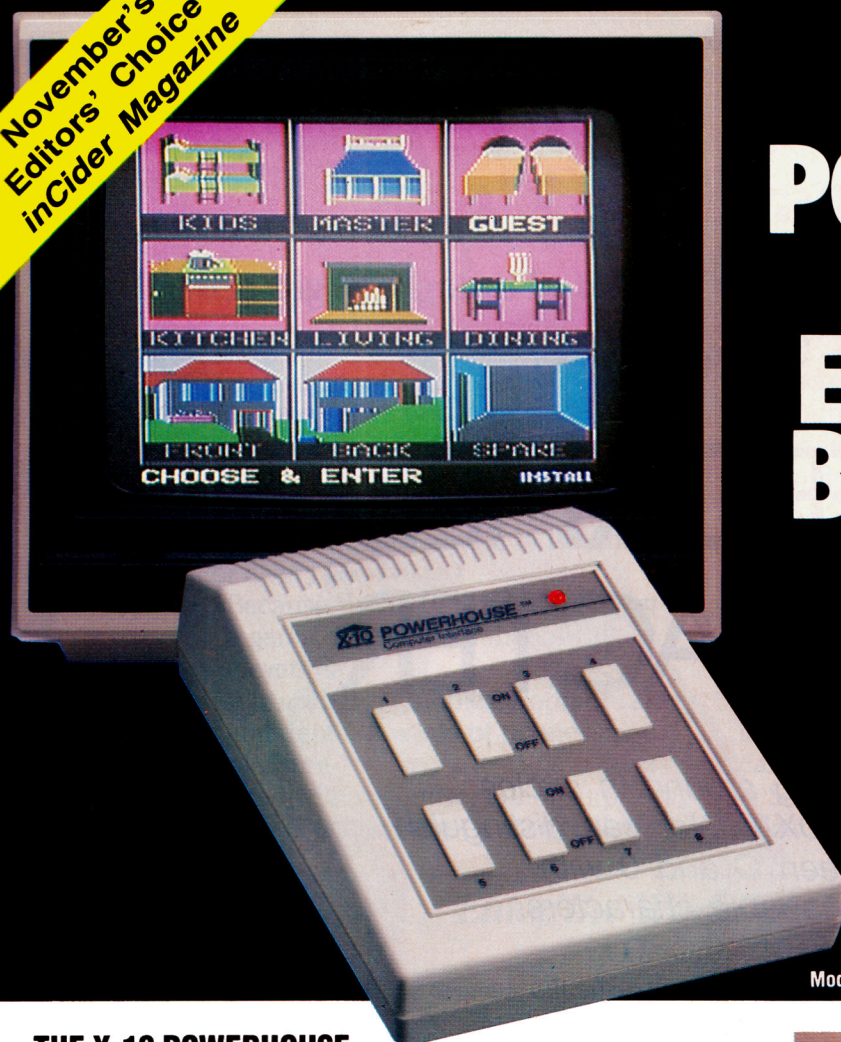
Listing continued.

```

4110 K = J
4120 CJ = SCRN( J,Y)
4200 FOR I = J + 1 TO 38
4210 IF SCRN( I,Y) > = CJ THEN 4300
4220 K = I
4230 CJ = SCRN( I,Y)
4300 NEXT I
4305 COLOR = SCRN( J,Y)
4310 VLIN 0,10 AT K
4320 COLOR = CJ
4330 VLIN 0,10 AT J
4400 NEXT
4500 RETURN
4999 :
5000 PRINT "SHELL SORT"
5005 H = 40
5100 H = (H - 1) / 3
5110 IF H = 0 THEN RETURN
5200 FOR J = H TO 38
5300 I = J - H
5310 X = SCRN( J,Y)
5400 IF X > = SCRN( I,Y) THEN 5600
5500 COLOR = SCRN( I,Y)
5510 VLIN 0,10 AT I + H
5520 I = I - H
5530 IF I > = 0 THEN 5400
5600 COLOR = X
5610 VLIN 0,10 AT I + H
5620 NEXT J
5630 GOTO 5100
5700 :
9000 TEXT : HOME : REM INSTRUCTIONS
9010 A$ = "SCREEN SORT DEMO"
9020 GOSUB 9600
9030 A$ = "BY P.C. LINCOLN"
9040 GOSUB 9600
9050 A$ = "AUGUST 1983"
9060 GOSUB 9600
9070 PRINT :A$ = "THIS PROGRAM DRAWS AN
      ARRAY OF STRIPES"
9080 GOSUB 9600
9090 A$ = "THEN OFFERS 5 WAYS TO SORT THE
      STRIPES"
9100 GOSUB 9600
9110 A$ = "YOU CAN COMPARE ALGORITHMS"
9120 GOSUB 9600
9130 A$ = "AGAINST EACH OTHER, OR AGAINST
      NEW DATA"
9140 GOSUB 9600
9150 A$ = "BEEPS SIGNAL START AND END OF
      SORTING"
9160 GOSUB 9600
9170 A$ = "CHOOSE 6 TO CHANGE THE PATTERN"
9180 GOSUB 9600
9190 A$ = "CHOOSE 0 TO EXIT"
9200 GOSUB 9600
9210 PRINT : PRINT "HIT ANY KEY TO START THE FUN.";
9220 GET T$: HOME : GR : RETURN
9600 T = LEN (A$):T = (40 - T) / 2
9610 IF T > 0 THEN PRINT SPC( T);
9620 PRINT A$: PRINT : RETURN
  
```

End of listing.

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The Gemini 10X:

A REFORMED CHARACTER

*Stop running around in circles.
Your Gemini 10X printer can distinguish
between O and 0 with
downloadable characters.*

by Phillip M. Jockell

It sounds like a scene from *Sesame Street*. What's the difference between O and 0? A lot—especially if you're working with printed program listings. Confusion, aggravation, and frustration greet the unobservant programmer who types an O instead of a 0 and vice versa.

Some dot-matrix printers have the option to print zeroes with or without slashes. Unfortunately, Star Micronics' Gemini 10X doesn't. A solution exists, though, and it involves a powerful, but seldom used, capability of the Gemini 10X.

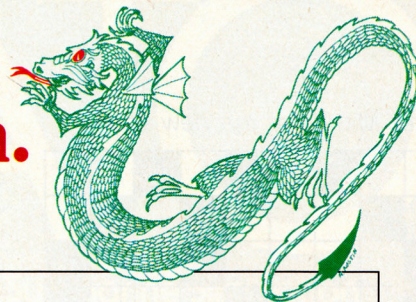
The Solution

The character shapes printed by the Gemini 10X are determined by either of two methods. The standard operating mode uses the character shapes stored

in the printer's ROM (read only memory). Appendix K of the Gemini 10X manual shows the shapes of various characters stored in the printer's permanent memory. ROM being what it is, you're stuck with the characters as defined by the folks who built the printer.

The second method used to define characters is through *downloadable* characters—information the computer sends to the printer, which is the less intelligent device. In this case, the data to be transmitted are the character descriptions that will be used in place of those stored in the printer's ROM. These new shapes are stored in the printer's RAM (random access memory). This is the method we'll use to make slashed zeroes.

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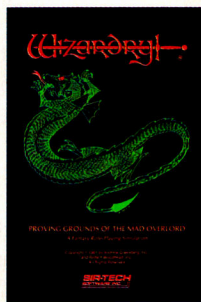
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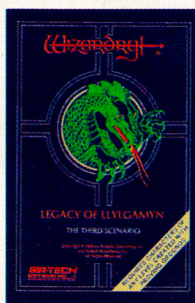


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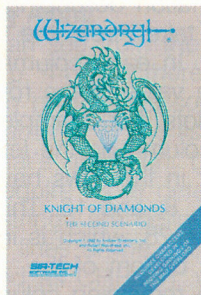


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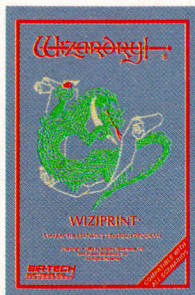


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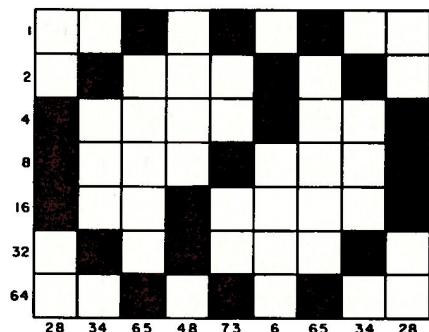
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Figure. Matrix for the new zero.



Chapter 8 in the Gemini 10X manual explains downloadable characters. You should review this chapter, but you don't need to master its contents before you use the program outlined here.

The Method

Before you start the program, look at the way new characters are defined and stored in the RAM area of the 10X. Designing the new zero was simple: I used

graph paper to prepare a "map" of the new character, then converted it to a form the printer could use.

First, I plotted a seven-row by nine-column matrix (see the **Figure**). The numbers running vertically along the left side are values assigned to each of the even-numbered horizontal rows. Listed as powers of two, these values start at the top with 1 (2^0) and end at the bottom with 64 (2^6).

Next, I put a dot in each of the matrix squares where I wanted ink to hit the paper. The printer manual advises that no two dots can be side by side on the same horizontal line, but doesn't explain why. This limitation might be aggravating if you were redesigning an entire set of characters, but it does not pose a problem in building the new zero.

It helps to sketch your character on top of the matrix to see how it will look. Nonetheless, my first redesigns were rather amusing. One looked like a capital O wearing a cowboy hat, so don't be surprised if your first tries don't look exactly as you envisioned them (especially if you make a math error, as you'll see later). After I was satisfied with the new character, I was ready to put it into a numerical form the computer could send to the printer. (See the **Figure**.)

The information describing the new zero is taken from the vertical columns. In each column, I summed the value of the rows containing dots. For example, look at the first column on the left. Dots appear in the rows having the values 4, 8, and 16. This column's total is 28, which is indicated at the bottom of the column. The remaining columns were totaled similarly, and the results are recorded at the bottom of each column. (A math error here can create a strange-looking character.)

These totals—and a wee bit more—are all you need to describe the new zero to the printer. Together, the information appears as:
 CHR\$(27) CHR\$(42) CHR\$(1) c1 d1
 t1 t2 t3 t4 t5 t6 t7 t8 t9

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The CHR\$(27) is actually *escape*, which precedes most control sequences sent to the Gemini 10X printer and identifies them as control sequences. The following character strings (42 and 1) comprise the command to accept data describing a character shape. Next comes the ASCII value of the character you want to define (c1). In this case, you are redefining 0, CHR\$(48).

The d1 in the command represents descender data and will always be a 1 or a 0. A descender is the part of the character that extends below the main body of the character, as in a lowercase "y." Obviously, the number 0 doesn't have a descender, so the descender datum is 0 in this instance. (Chapter 8 in the printer manual details how to handle characters with descenders.)

Now you must combine the above control sequences with the matrix column totals described earlier. The data t1 through t9 represent the totals (left to right) of the columns shown in the **Figure**. When you combine the information, you receive the following data:

```
CHR$(27) CHR$(42) CHR$(1)
CHR$(48) CHR$(0) CHR$(28)
CHR$(34) CHR$(65) CHR$(48)
CHR$(73) CHR$(6) CHR$(65)
CHR$(34) CHR$(28)
```

Stringing Along

You can see from the **Program listing** (p. 44) that there is little involved in putting this solution to work. Remarks in the listing explain what's going on, but some points require more detail.

Four strings are defined in the first four lines of the program. D\$ is defined as CHR\$(4), which is control-D. In turn, control-D identifies all DOS (disk operating system) commands. E\$ is defined as escape and has two functions: It alerts the printer that it must accept the following characters as printer commands, and it also serves as a one-key input in the program. Since I have an Apple parallel-printer interface card, I\$ is defined as control-I for interface

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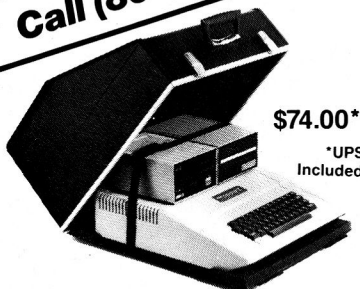
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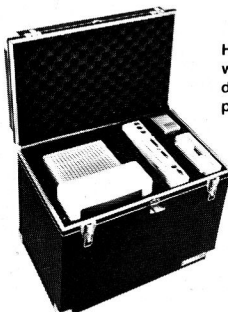
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commands. Because the system is "intelligent," you must give specific instructions to all parts of it. The last string, R\$, is defined as CHR\$(13) which is return (another one-key input).

After you make the definitions, lines 50 through 90 clear the screen and display a message explaining the program. This short description and an opportunity to gracefully exit the program are preferable alternatives to unknown happenings that result in the sole, sinister] prompt left on the screen at the end of BASIC programs.

Lines 100 through 120 let you decide whether to continue or quit the program. There is very little here that isn't standard practice. In line 100, POKEing 0 into location -16368 clears the keyboard buffer. This avoids erroneous responses caused by key bounce, accidentally hitting the keyboard, and the like. Using the POKE with every GET statement results in fewer operator errors. Lines 110 and 120 limit valid responses to Y (yes) or N (no).

Once you run the program, lines 140 through 200 give you the opportunity to get the printer ready before the computer sends data to it (and give you one last opportunity to exit the program). These options work the same way as the previous yes/no option, but the screen format isn't quite the same. Lines 210 and 220 direct output to the printer and prevent the echoing of data on the monitor screen. Line 230 prints a line containing the original zero for later comparison to the new model.

Lines 240 through 260 contain the power of this program. As the REMARK points out, line 240 copies the ROM character definitions into RAM. Keep in mind that if you send only one character definition to RAM, that's the only character the printer will know how to make. The command expressed in line 240 simply copies all the ROM shape descriptions into RAM so you don't have to

re-create the entire font to change only one character.

Line 250 contains the command and the description defining the new zero, while line 260 tells the printer to actually use the downloaded character set. At this point, you can switch between the ROM characters and those stored in RAM with:

CHR\$(27) CHR\$(36) CHR\$(0)

One peculiarity of the printer is that turning downloadable characters on or off during a line affects all characters in that line. If you select RAM characters halfway through a printed line, all the characters on that line will be printed using RAM characters. The same is true if you select ROM characters: The entire line is printed from ROM characters.

The final lines of the program show what the new zero looks like, along with the letter O for contrast, and return output to the monitor screen.

After you run the program to make sure it performs as advertised, delete line 230 and lines 270 through 300 to avoid wasting a sheet of paper each time you use the program.

For Clarity's Sake

The technique presented here can improve the readability of your program listings and may even clarify your word processor's output. Put lines 240-260 to work by adding them to a utility program.

The more ambitious among you may even implement your own character set for the 10X. Imagine printing in Old English, Goudy, or Times Roman. How about converting the fonts in popular video-graphic writing programs to work with the 10X? Or maybe even writing a program to handle the conversion for you?

As for me, I think I'll tackle that ridiculous-looking lowercase "j" the 10X makes. ■

Address correspondence to Phillip M. Jockell at Route 1, Box 268, Glendale, KY 42740.

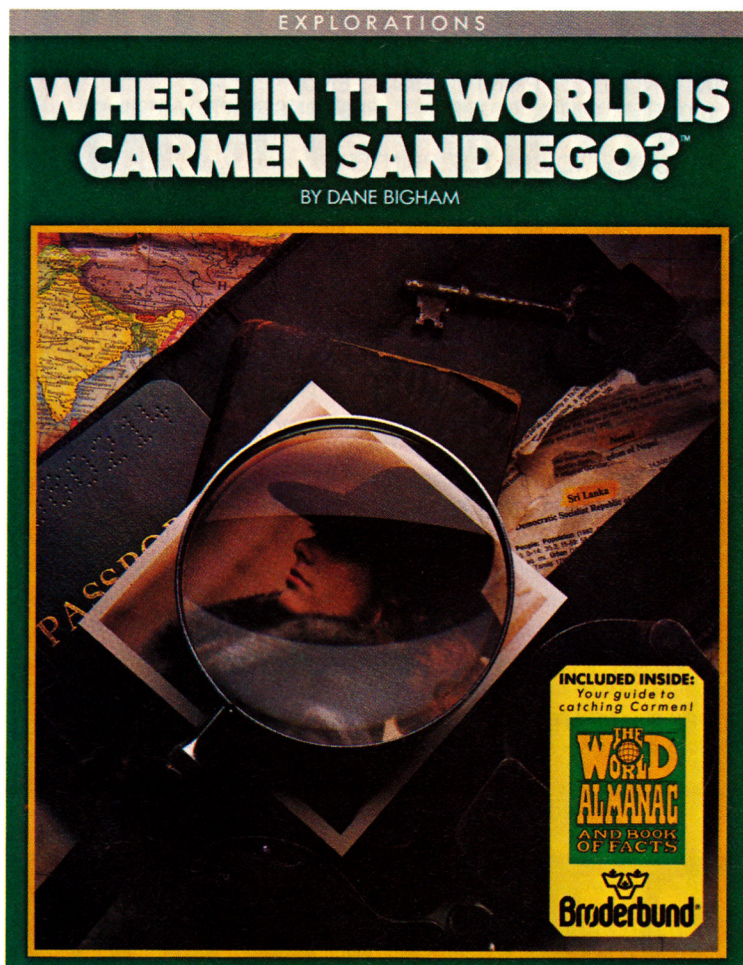
MYSTERY! INTRIGUE! ADVENTURE! EXPLORE THE WORLD'S GREAT CITIES AS YOU STALK
A MASTER THIEF TO THE FAR CORNERS OF THE GLOBE!

"Excuse me, have you seen this woman?"

SOMEONE HAS MADE OFF WITH the Statue of Liberty's torch...and you've been assigned to the case! This could only be the work of *Carmen Sandiego* and her gang—the dastardly crew that has sworn to swipe each and every one of the world's most famous landmarks and treasures.

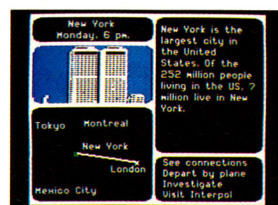


You're off on a whirlwind international chase! From London, to Bamako, to Peking, to Kathmandu...you'll find yourself in one strange city after another, with only your Crime Computer and your trusty copy of *The World Almanac* to guide you. You'll learn to use your



WHERE IN THE WORLD IS CARMEN SANDIEGO? combines all the best aspects of graphic adventures, mysteries, and arcade animation in a captivating crook's tour of the world. It comes complete with *The World Almanac*® and *Police Dossier* on Carmen and her gang. Players can work together, with one operating the computer while the other scours *The Almanac* and *Dossier* for vital information. With 10 possible suspects, 30 cities, and nearly 1,000 clues, *Carmen Sandiego* is a different game every time you play—for endless hours of family entertainment.

computer and *Almanac* together to find your way around and decipher the clues you uncover. And, with enough dogged detective work, you'll soon collar the cunning culprit.



But don't get overconfident! The Mona Lisa, The Crown Jewels... you've got more treasures to protect, more cases to crack, more crooks to catch.

So now that you know what you're up against, what in the world are you waiting for?



WHERE IN THE WORLD IS CARMEN SANDIEGO? is available for Apple personal computers. Look for it at your favorite Broderbund Software dealer. For more information about Broderbund products, please write us at 17 Paul Drive, San Rafael, California 94903-2101. Apple is a registered trademark of Apple Computer, Inc. The World Almanac is a registered trademark of Newspaper Enterprise Association, Inc. © 1985 Broderbund Software, Inc.

Program listing. Slashed zeroes for the Gemini 10X printer.

```
10 D$ = CHR$ (4): REM CONTROL - D (FOR DOS COMMANDS)
20 E$ = CHR$ (27): REM ESCAPE (FOR PRINTER COMMANDS & ONE KEY INPUTS)
30 I$ = CHR$ (9): REM CONTROL - I (FOR INTERFACE COMMANDS)
40 R$ = CHR$ (13): REM RETURN (FOR ONE KEY INPUTS)
50 HOME
60 PRINT "THIS PROGRAM WILL MAKE THE GEMINI 10X"
70 PRINT "PRINTER MAKE SLASHED ZEROES."
80 PRINT : PRINT
90 PRINT "IS THAT WHAT YOU WANT TO DO? > ";
100 POKE - 16368,0: GET A$: REM (THE POKE CLEARS THE KEYBOARD BUFFER)
110 IF A$ = "N" THEN PRINT "NOPE....": PRINT : PRINT : END
120 IF A$ < > "Y" THEN 100: REM ONLY "Y" OR "N" RESPONSE ALLOWED
130 PRINT "YEP": PRINT : PRINT
140 PRINT "> < PRESS <RETURN> TO SET THE PRINTER"
150 PRINT "      PRESS <ESCAPE> TO QUIT"
160 VTAB 8: HTAB 2: REM POSITION THE CURSOR BETWEEN THE ARROWS IN LINE 140
170 POKE - 16368,0: GET A$: REM (THE POKE CLEARS THE KEYBOARD BUFFER)
180 IF A$ = E$ THEN PRINT "": VTAB 12: END
190 IF A$ < > R$ THEN 170: REM ONLY <ESCAPE> OR <RETURN> RESPONSE ALLOWED
200 PRINT ""
210 PRINT D$;"PR#1": REM DIRECT OUTPUT TO THE PRINTER (INTERFACE) AT SLOT #1
220 PRINT I$;"80N": REM      TURN OFF PRINTING TO THE VIDEO SCREEN (AN INTERFACE COMMAND)
230 PRINT "      The old zero - > 0"
240 PRINT E$;"*"; CHR$ (0):: REM DOWNLOAD THE PRINTER'S ROM CHARACTER SET INTO RAM SO IT CAN BE
    MODIFIED
250 PRINT E$; CHR$ (42); CHR$ (1); CHR$ (48); CHR$ (0); CHR$ (28); CHR$ (34); CHR$ (65); CHR$ (48); CHR$ (73);
    CHR$ (6); CHR$ (65); CHR$ (34); CHR$ (28):: REM REDEFINE THE "0" SO IT HAS A SLASH
260 PRINT E$; CHR$ (36); CHR$ (1): REM TELL THE PRINTER TO PRINT USING THE DOWNLOADED CHARACTER SET
270 PRINT "The letter 'oh'      - > 0"
280 PRINT
290 PRINT "The new zero      - > 0"
300 PRINT : PRINT
310 PRINT D$;"PR#0": REM REDIRECT OUTPUT TO THE VIDEO SCREEN
320 PRINT : PRINT : PRINT
330 PRINT "ALL DONE....": PRINT : PRINT
```

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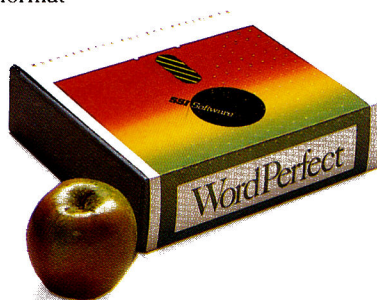
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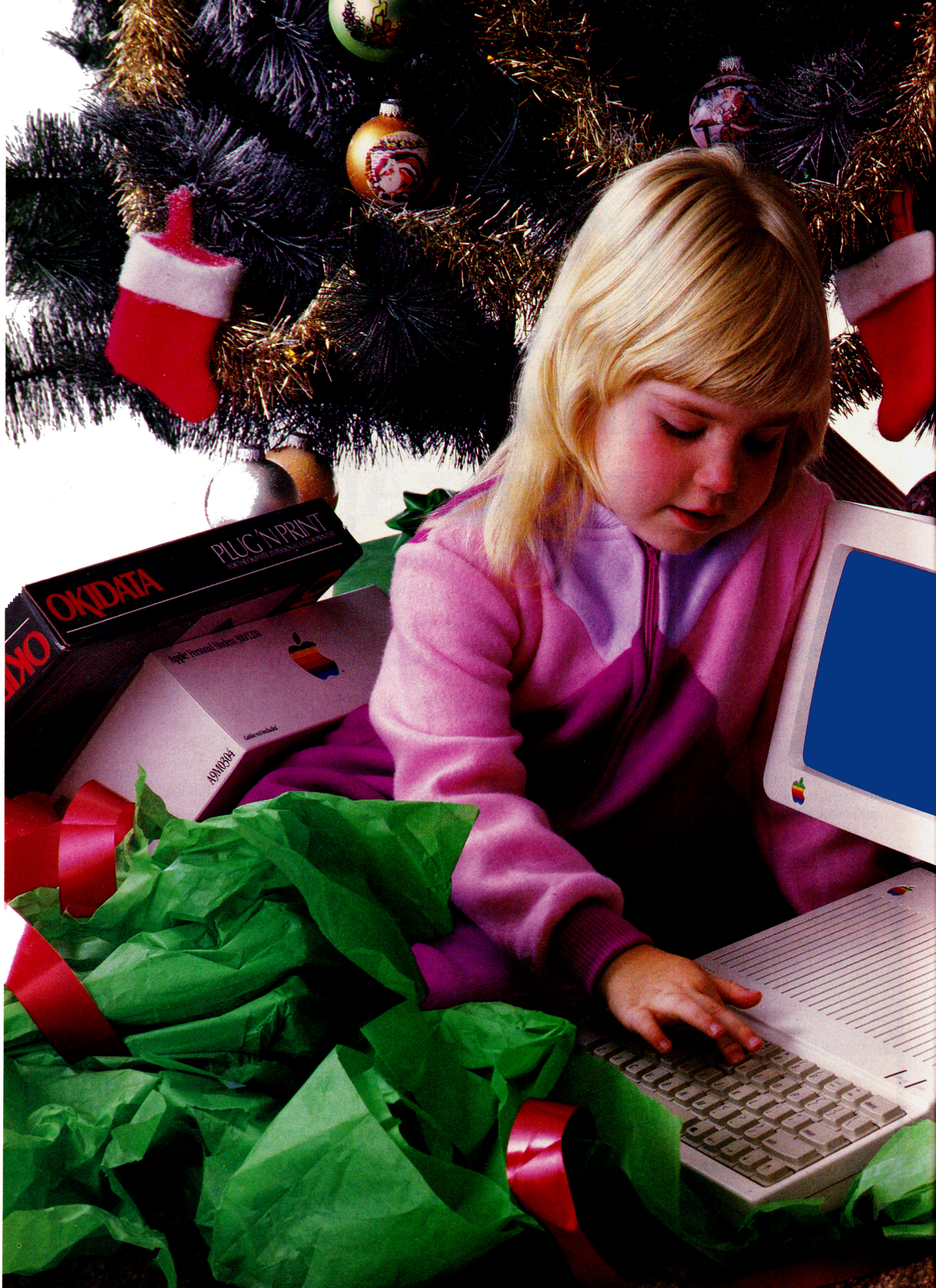


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HOLIDAY GIFT GUIDE

Before you journey into the recesses of your local shopping mall this season, thumb through our helpful guide. From whimsical stocking stuffers to practical peripherals, we know you'll find something for every Apple fan on your list.

The Wish List

Reasonably priced gifts that are practical, tempting, or off the wall. . . .

Racter

Do you get lonely during those late nights at your computer? Boot up Racter and spark up a conversation. Racter is a game with a 2800-word vocabulary and a knowledge of English grammar, and it'll respond to your questions at the keyboard. Mindscape used some of the latest advancements in artificial intelligence and speech to produce Racter. \$44.95 from Mindscape, 3444 Dundee Road, Northbrook, IL 60062, (312) 480-7667.

Captain Goodnight and the Islands of Fear

Sit for hours in front of a Christmas movie? Why not star in Captain Goodnight? You're the superhero of the '80s, on a mission to save the world from the evil Dr. Maybe's Doomsday Machine. Captain Goodnight is none too bright, but the color graphics are spectacular. \$34.95 from Broderbund, 17 Paul Drive, San Rafael, CA 94903, (415) 479-1170.

Science Kits

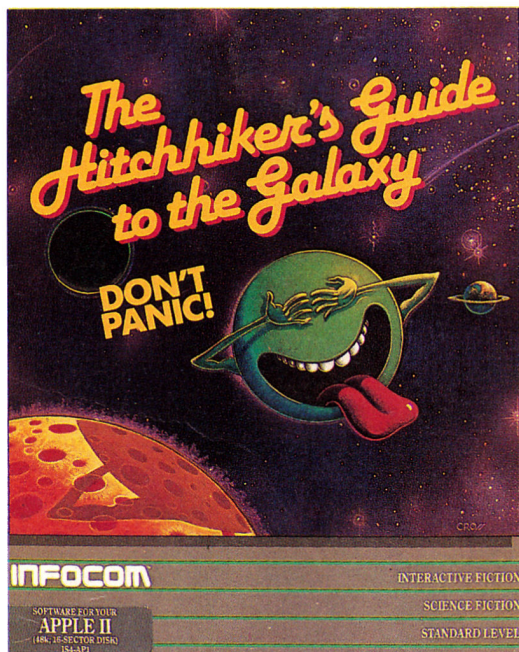
Every scientist worth his or her Periodic Table knows the importance of accuracy in successful experiments. Temperature Lab includes a temperature sensor and an alcohol-bulb thermometer to check readings against the computer. \$99.95 from Hayden Software, 650 Suffolk Street, Lowell, MA 01854, (617) 937-0200.

Disk Holder

Keep your disks safe in a solid oak, roll-top storage chest from Smith and Bellows. You can easily find any of the 70 disks you can store in this nicely finished chest, and the oak protects them from static charges. \$59.95 from Smith and Bellows, P.O. Box 668, Amherst, NH 03301, (603) 889-5311.

Of course, our gift guide's just a sampler of items available for your Apple (and we can't endorse the products' performance).





The Hitchhiker's Guide to the Galaxy

Travel light as you hitchhike across the galaxy with Arthur Dent and Ford Prefect in this all-text adventure based on the popular book and TV series. \$39.95 from Infocom, 125 Cambridge Park Drive, Cambridge, MA 02140, (617) 492-6000.

F-15 Strike Eagle

See if you have the right stuff to be a fighter pilot in F-15 Strike Eagle, an air-combat simulation that challenges your abilities with seven missions at four skill levels. Get your wings for \$34.95 from MicroProse Software, 120 Lakefront Drive, Hunt Valley, MD 21030, (301) 667-1151.

Elfware

Children (and adults, too) can't help but smile with Elfware—three early-learning programs that teach letter

and number recognition and hand-eye coordination, all to an enchanting classical-music score. \$17.50 each or \$39.95 for the set (a holiday special) from Elfware, P.O. Box 118, Pollock Pines, CA 95726, (916) 644-3300.

Turbo Pascal

The third version of Turbo Pascal executes and compiles twice as fast as the second. Now it also features graphics, optional binary-coded decimal support, I/O redirection, and a memory-mapped editor. Turbo Pascal 3.0 sells for \$69.95. If you have the 2.0 version, you can get a \$39.95 credit on trade-in from Borland International, 4113 Scotts Valley Drive, Scotts Valley, CA 95066, (408) 742-1133.

Fontrix

The medium is the message. Expand your typographical horizons with this character-generator package—it adds numerous type styles, rules, flowcharts, and more to turn humdrum print into dynamite graphics. \$95 from Data Transforms, 616 Washington Street, Suite 106, Denver, CO 80203, (303) 832-1501.

Party Quiz Game

Your computer can be the life of the party. The Party Quiz Game asks questions on a variety of topics to test your trivia knowledge. \$49.95 from Suncom, 260 Holbrook Drive, Wheeling, IL 60090, (312) 459-8000.

Fantavision

Create your own animation on your Apple II with Fantavision, a special-effects generator and full-screen animation system. \$49.95 from Broderbund Software, 17 Paul Drive, San Rafael, CA 94903, (415) 479-1170.

MouseWrite

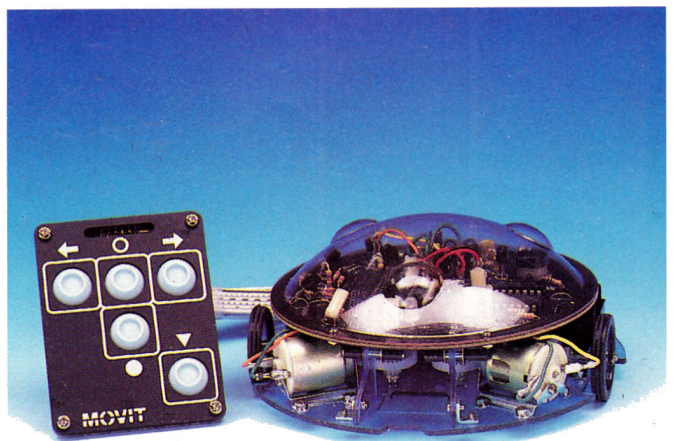
You can now do word processing on your Apple with a mouse. MouseWrite's pull-down menus, windowing, and mouse support all bring Mac-like ease of use to your IIc or enhanced IIe. \$124.95 from Roger Wagner Publishing, 10761 Woodside Avenue, Suite E, Santee, CA 92071, (619) 562-3670.

Gato

Command your own submarine in Gato, a World War II simulation game. You'll participate in heroic missions that range from rescuing a downed pilot to attacking patrol boats. \$39.95 from Spectrum Hobby, 1050 Walnut Street, Suite 325, Boulder, CO 80302, (303) 443-0191.

Apple Pets

Robots are here—the Memcon Crawler takes orders from your Apple. \$74.95 from OWI Inc., 1160 Mahalo Place, Compton, CA 90220, (213) 638-4732.





Curti Surge Protectors

This line of gems is an Apple II's best friend. The Curti electronic surge protectors guard your computer and system hardware against voltage surges. The Diamond, Emerald, Ruby,

and Sapphire all have an on/off switch for complete system power down/power up. Also available on some units is EMI-RFI filtering and a 6-foot power cord. From \$49.95 to \$89.95; from Curti Manufacturing, 305 Union Street, Peterborough, NH 03458, (603) 924-3823.

X-10 Powerhouse

Come home for the holidays to a house controlled by your Apple. The X-10 Powerhouse takes care of turning on the tree and leaving a light on for Santa, while all through the house not a computer is stirring. Approximately \$135 (depending on the size of your home) from X-10 USA, 185A Legrand Avenue, Northvale, NJ 07647, (201) 784-9700.



Stocking Stuffers

A little something for everyone. . .

Computer Museum Cards

I'll see your Pascal and raise you two Charles Babages. Liven up your game with playing cards sporting portraits of Pascal as the Jack, Ada Lovelace as the Queen, and Charles Babage as the King. \$9.95 from The Computer Museum Store, Museum Wharf, 300 Congress Street, Boston, MA 02210, (617) 426-2800.

Boston Computer Society Membership

Searching for high-tech answers to high-tech questions? The Boston Computer Society, considered the most prestigious user group in the country, is dedicated to helping you get the most out of your computer. A one-year membership costs \$28. The Boston Computer Society, 1 Center Plaza, Boston, MA 02108, (617) 367-8080.

Screenwipes

Make sure you're seeing all you can on your monitor. Clean your screen once a week with Screenwipes—individually wrapped towellettes similar to Wash 'n' Dries. 50 packets (a one-year supply), \$20, from Aldine Paper Company, 315 Park Avenue South, New York, NY 10010, (212) 505-1000.

Delphi

Modem users needn't consult a sybil to subscribe to Delphi—it's a consumer-oriented, straightforward online information service. Starter kit, \$29.95 (command card plus one free evening hour) from General Videotex Corporation, 3 Blackstone Street, Cambridge, MA 02139, (800) 544-4005, (617) 491-3393.

Colored Disks

Brighten up your drab, run-of-the-mill software collection with colored floppy disks from Fuji. Boxes of ten disks in assorted hues (red, blue, green, beige, and gray) are priced at \$22 (single-sided) and \$30 (double-sided). Fuji Photo Film U.S.A., 350 Fifth Avenue, New York, NY 10118, (212) 736-3335.

First Touch Keystrip

Shocking, but true. Avoid static-electricity shocks with the 3M static "Touch Me First" pad—an 11-inch adhesive strip that attaches to your computer keyboard. \$19.95 from 3M Static Control Systems Div., Box 2963, Austin, TX 78769, (512) 834-6563.

Beagle Bros Chart

No programmer should be without a Peeks, Pokes, and Pointers wall chart. It's the perfect stocking stuffer at the perfect price—it's free from Beagle Bros, 3990 Old Town Avenue, Suite 102C, San Diego, CA 92110, (619) 296-6400.

Diskribe

Write on it—your disk sleeve, that is—with Diskribe markers' silver or gold quick-drying, permanent ink. \$2.50 each from Sanford Corporation, 2740 Washington Boulevard, Bellwood, IL 60104, (312) 547-6650.

inCider BBS E-Mail

If you haven't received any good mail lately, open an E-Mail box on inCider's bulletin-board system. Call (603) 924-9801 with your modem. Once you're verified, you can access bulletins, downloads, and specialty boards. Best of all, it's free.





Grappler C and Hotlink

Orange Micro can guide your printer tonight—the Hotlink, a printer-interface card, provides complete serial-to-parallel conversion, letting all the most popular printers work with your //c. The intelligent Grappler C, a printer-interface card, includes special software that provides graphics screen-dump capabilities. \$69 for Hotlink, \$119 for Grappler C. Both from Orange Micro, 3150 East La Palma, Suite 1, Anaheim, CA 92807, (714) 630-3622.

//e Enhancement Kit

It's new and improved! Give your favorite //e owner an enhancement kit (65C02 microprocessor, two new monitor ROM chips, and one new character-generator ROM chip) to upgrade his or her system. \$70 from Apple Computer, 20525 Mariani Avenue, Cupertino, CA 95014, (408) 996-1010.

Computer Insurance

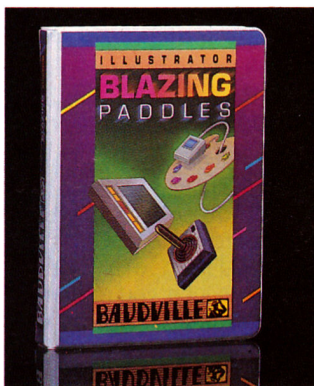
Gotcha covered. Protect your Apple investment from theft and damage with computer insurance. \$39–\$69 per year from Safeware, 2929 North High Street, Columbus, OH 43202, (614) 262-0559.

World's Greatest Football and Baseball Games

The Super Bowl is on the horizon, but why waste your time with the tube when you could be playing The World's Greatest Football Game? Design 120 plays, and watch the action from the sidelines or the simulated Goodyear blimp. Or, if crashing bodies appeal to you less than green grass and grace, try The World's Greatest Baseball Game. Epyx gives you the 1984 stats for all the big-league teams. \$35 each from Epyx Computer Software, 1043 Kiel Court, Sunnyvale, CA 94089, (408) 745-0700.

Seiko Programmable Watch

Dick Tracy's got nothing on you. Carry 2K of memory on your wrist with the Seiko PC Datagraph RC-1000 multifunction quartz wrist terminal. Hook it up to your home Apple, and select the information to be stored. Complete with connecting cable and Apple software, the PC Datagraph retails for \$150 from Hattori America, Consumer Electronics Division, 1330 West Walnut Parkway, Compton, CA 90220, (213) 603-9550.

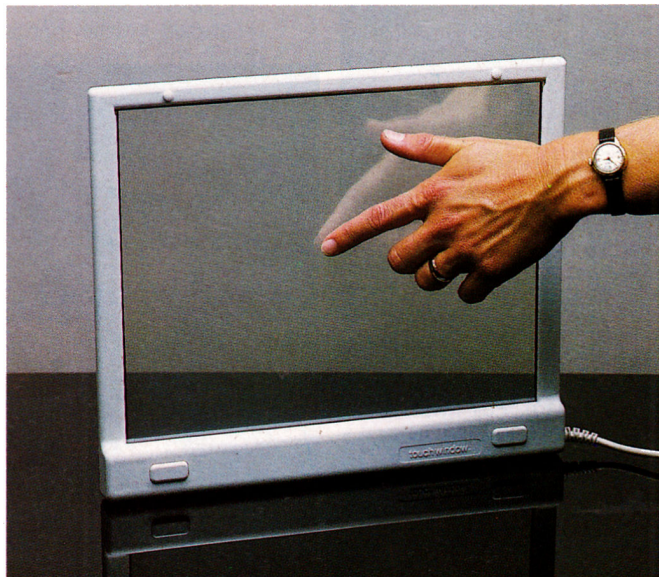


Blazing Paddles

Discover your talent for graphics art with Blazing Paddles, a graphics tool kit with an assortment of animals, trees, buildings, geometric shapes, and musical symbols and instruments. \$49.95 from Baudville, 1001 Medical Park Drive S.E., Grand Rapids, MI 49506, (800) 824-8873, or (616) 957-3036 in Michigan.

Touch Window

No more keyboard antics for you. Touch Window converts your Apple to a see-through touch-screen system. The pressure-sensitive surface allows immediate interaction—simply touch the screen with your finger. Turn your screen into an input device. \$195 from Personal Touch, 4320 Stevens Creek Boulevard, Suite 290, San Jose, CA 95129, (408) 246-8822.



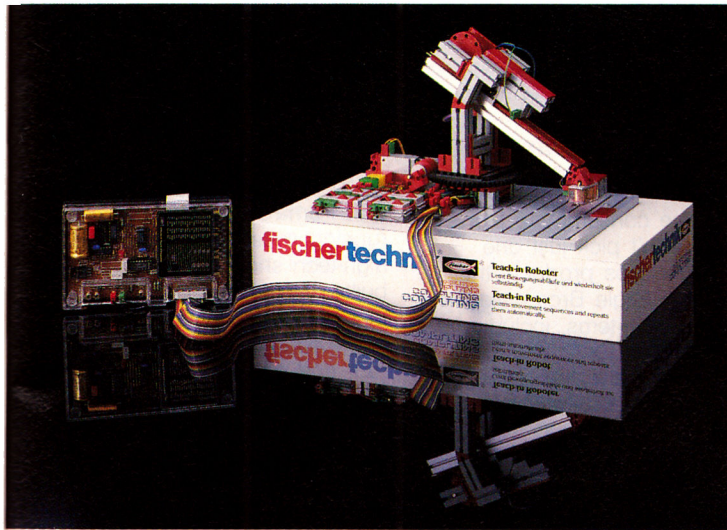
Video Glasses

Is that you squinting in front of the computer monitor? Relieve eye fatigue with a pair of amber-colored eyeglasses designed to filter ultraviolet radiation emitted by video display terminals. Prices start at \$39.95 from Fran C Distributors, 3 Yellowbrick Court, Northport, NY 11768, (516) 544-9051.

fischertechnik Robotic Computing Kit

Isaac Asimov would be proud—learn all about robotics with the fischertechnik Robotic Computing Kit.

The kit includes everything you need to build your own computer-controlled robot. \$199 from fischer America, 175 Route 46 West, Fairfield, NJ 07006, (201) 227-9283.



Winter Games

Let it snow, let it snow. . . . Toast your toes in front of a warm Apple and play Winter Games—a preview of the 1988 Winter Olympics. Ski jumping, ski biathlon, hotdogging, bobsledding, and ice skating are the events in this snowy challenge from the folks who brought you Summer Games. \$35 from Epyx Computer Software, 1043 Kiel Court, Sunnyvale, CA 94089, (408) 745-0700.

Wilderness

If Santa's sleigh were to take a dive into the Sierra Nevada mountains, he'd be glad he played Wilderness, a chilling simulation of a survival trek through the hills. Three-dimensional graphics and realistic problems bring Wilderness alive. \$50 from Electronic Arts, 2755 Campus Drive, San Mateo, CA 94403, (415) 571-7171.

Patchworks

Computer technology discovers a pastime your grandmother and her grandmother before her enjoyed—quilting. Patchworks software brings computer-aided design to quilting, embroidery, and other needle arts. Patchworks even calculates how much material you'll need to make an actual quilt. \$59.95 from Random House Software, 201 East 50th Street, New York, NY 10022, (212) 751-2600.

KoalaPad +

By all means, touch the KoalaPad + to draw "free-hand" with your Apple II. The KoalaPad + includes KoalaPad tablet, Koala Painter program, and Graphics Exhibitor software. \$125 from Koala Technologies, 3100 Patrick Henry Drive, Santa Clara, CA 95050, (408) 946-4483.

Bank Street Mailer

Bank Street writers struggling with holiday card lists and check mailings, rejoice: Bank Street Mailer, a new mailing-list and letter-writing program, carries on in the easy-but-powerful tradition of Bank Street Writer and Filer. \$69.95 from Broderbund, 17 Paul Drive, San Rafael, CA 94903, (415) 479-1170.

Voice Master

Your Apple will be wishing you happy holidays and singing along on Christmas Eve with the Voice Master. The speech synthesizer and voice-recognition software are only the wrapping on this present: The unique Voice Harp module is a digital musical instrument you can play by humming or whistling. The complete hardware and software system sells for \$89.95 from Covox, 675-D Conger Street, Eugene, OR 97402, (503) 342-1271.



Computer Quilts

Keep your Apple cozy in comfy blankets in rainbow shades. The washable fabric allows heat to escape, but prevents dust from getting in. You can tuck in your mouse and other peripherals, too. \$4.95 to \$35.95 from Computer Quilts, P.O. Box 1212, Killeen, TX 76541, (817) 634-6177.

The Black Cauldron

From the silver screen to your computer screen comes The Black Cauldron, an adventure game based on Walt Disney's animated feature film. \$39.95 from Sierra On-Line, P.O. Box 485, Coarsegold, CA 93614, (209) 683-6858.



Holiday Gift Guide

Holiday Extravanzas

A little luxury goes a long way. . .

ColorMonitor //e and ColorMonitor //c

Add color to your Apple world with the ColorMonitor //e or ColorMonitor //c—13-inch, 80-column-display, composite monitors. \$450 each from Apple Computer, 20525 Mariani Avenue, Cupertino, CA 95014, (408) 996-1010.

UniDisk 3.5

Good things come in small packages. The UniDisk 3.5, a double-sided 3½-inch disk drive, has almost six times the capacity of your old 5¼-inch drive—800K bytes. And, according to Apple, the UniDisk 3.5 functions either as a boot drive or a secondary drive. Approximately \$500 from Apple Computer, 20525 Mariani Avenue, Cupertino, CA 95014, (408) 996-1010.

The Roommates

There's nothing odd about this couple—The Roommates, a pair of Bose speakers, let your Apple II perform in stereo. \$229 from Bose, 78 Turnpike Road, Westboro, MA 01581, (800) 343-6942, or (617) 366-9896 in Massachusetts.



Okimate 10 and 20 Personal Color Printers

Paint Christmas red and green with the Okimate 10 and 20, low-cost ribbon-transfer printers. The 10 draws in 50 colors, the 20 in 100, on almost any kind of paper—and the screen-dump software included lets you reproduce anything on your monitor. \$208 (10), \$258 (parallel 20), \$268 (serial 20) from Okidata America, 532 Fellowship Road, Mount Laurel, NJ 08054, (609) 235-2600.



Everything from the Beagle Bros Catalog

For the consummate techie who can't pick just one Beagle Bros product—the entire Beagle Bros collection of 22 items, including the utilities Extra K and DiskQuik, and the game I.O. Silver. \$734.45 from Beagle Bros, 3990 Old Town Avenue, Suite 102C, San Diego, CA 92110, (619) 296-6400.

Halley's Comet

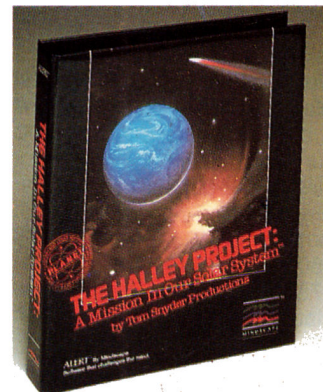
Astronomy nuts, or anyone else for that matter, can learn about Halley's Comet—where to look for it, its history, and its position for any date and location, with The Halley Project from Mindscape. If that doesn't sate your comet curiosity, then how about a trip to Australia for better viewing of the famed nighttime apparition? Saga Holidays of Boston, Massachusetts, offers a 26-night land-tour and cruise package around Australia and New Zealand—that should give you plenty of time for comet watching. Rates for the tour range from \$3829 to \$4209 for December through February. Saga International Holidays is located at 120 Boylston Street, Boston, MA 02116, (800) 762-3413. Screen-bound comet watchers can get The Halley Project for the less celestial price of \$49.95 from Mindscape, 3444 Dundee Road, Northbrook, IL 60062, (312) 480-7667.

Puma Sneakers

Keep track of every mile with Puma's new computer running sneakers. Puma's high-tech shoes have a built-in electronic device that hooks up to your //e to figure time and distance run, and energy or calories expended. \$200 from Puma, 492 Old Connecticut Path, Framingham, MA 01701, (617) 875-0660.

MultiRam //EX and MultiRam //CX

MultiRam X boards are among the first to use the 65816 MPU, a 16-bit processor that can also run all your 8-bit software. They work with Checkmate's MultiRam //e and //c memory-expansion boards. MultiRam //EX, \$189.95; //CX, \$449.95 (includes 256K of RAM); //c RAM-card upgrade, \$149.95, from Checkmate Technology, 509 South Rockford Drive, Tempe, AZ 85281, (602) 966-5802.



Passport Apple //c Music Software

Carolers and bell ringers can enter the computer age with Passport's complete music-synthesis package for the //c (part number MP-04A). For a mere \$1009.65—remember, it's Christmas—the musician on your list gets a Passport MIDI Interface with Tape and Drum/Clock Sync, a MIDI/8 Plus, MIDI/4 Plus, MIDI Player, Polywriter, Leadsheet, and the Polywriter utilities. From Passport Designs, 625 Miramontes Street #103, Half Moon Bay, CA 94019, (415) 726-0280.

Original IBM PCjr Keyboard

Looking for something a little more stylish than a wooden wedge to prop open your door? How about an original IBM PCjr keyboard? You can let the world know of your interest in computers, while paying homage to those gone by. Get your high-tech doorstop from IBM; call (800) 426-3332 for the product center nearest you.



HX-9 Color Monitor

If you're tired of your monochrome monitor, the 9-inch HX-9 color monitor can brighten up your computing. The HX-9 features RGB capability, a black-matrix nonglare screen, and 16 full colors in Apple mode. A green-amber text switch is built in. \$650 from Princeton Graphic Systems, 170 Wall Street, Princeton, NJ 08540, (800) 221-1490, (609) 683-1660.

Hayes Smartmodem 2400

Bring your telecommunicating technology up to 2400 baud with the Hayes Smartmodem 2400, and be ready for high-speed information transfer. \$899 from Hayes Microcomputer Products, P.O. Box 105203, Atlanta, GA 30348, (404) 441-1617.

TeamMate Hard Disk

It doesn't work with any operating system but ProDOS, and its back-up procedures aren't the best,



but the TeamMate 10-megabyte has the best read/write performance of any hard disk available for your Apple. \$1695 from Data Technology, Department TM-1A, 2525 Walsh Avenue, Santa Clara, CA 95051, (800) 824-3724.

Cari

Pack up your //c and go—thanks to the Cari Portable Powered Work Station, a rechargeable battery system that lets you hit the road. \$249.95 from Discwasher, 1407 North Providence Road, P.O. Box 6021, Columbia, MO 65205, (314) 449-0941.

Imagewriter II

Keep your high-tech image intact within your close computer circle. The Imagewriter II is a 10-inch color printer that comes with a 2K buffer and an expansion slot. Clocked at 250 characters per second in draft mode, Imagewriter II costs around \$600 from Apple Computer, 20525 Mariani Avenue, Cupertino, CA 95014, (408) 996-1010.

Multicore

Give your II a practical enhancement: Multicore, a multifunction memory-expansion card, provides parallel and serial interfaces with a ProDOS-compatible clock/calendar and lithium battery for time- and date-stamping files. \$219 for Multicore with no memory, \$279 for 64K, \$329 for 128K, \$399 for 256K, from Quadram Corporation, 1 Quad Way, Norcross, GA 30093, (404) 923-6666.

Rubbermaid Workstation

Do your computing in comfort and style. Rubbermaid's adjustable modular workstation holds your CRT and keyboard in the position that suits you best. Accessories available—shelves, copy holders, tables, and more. Outfit your office for \$555 and up, from Rubbermaid Commercial Products, 3124 Valley Avenue, Winchester, VA 22601, (800) 336-7306, (703) 667-8700.

Keep Wishing List...

Fantasies to keep the holiday spirit alive all year long. . . .

Enhanced Applesoft BASIC

Wouldn't you love to have an Applesoft BASIC upgrade that would give you direct control of double-high-resolution graphics, let you use all the memory in your Apple, and fit snugly into ROM? Sure you would—and so would just about everyone else who is currently programming in Applesoft.

Apple Laser Printer

LaserWriter isn't just for the Macintosh anymore. Yes, you can run a LaserWriter with an Apple II, but only via the LaserWriter's serial port. Wouldn't you like to be able to hook up a LaserWriter via the AppleTalk network and take advantage of its graphics language, PostScript? No need to wish too hard about this one—something may be in the wind.

Read/Write Laser Disk Drive

Already tired of the 800K per disk that Apple's new UniDisk 3.5 gives you?

Bored with the 10-mega-byte Sider? Well, there's hope on the far horizon for all those who feel that current direct-access storage is inadequate. Just keep wishing for the technology that will let your computer read from and write to an optical disk. What would you do with a couple of gigabytes of storage?

32-Bit Apple II

What about a computer based on the Motorola 68020 microprocessor—a true 32-bit MPU? This machine would emulate the Apple II by brute force, translating and executing 6502 instructions as it encountered them. Of course,

it would also execute native-mode programs that would blow the doors off the Macintosh, the PC AT, the Amiga, and even the MicroVAX II. Just imagine this Apple under your Christmas tree.

Steve Wozniak Back at Apple

Okay, the MacFanatic is gone, so why don't the big boys make an attempt to woo our favorite computer designer back into the fold? Stevie, come home!

The Truth About inCider

You probably already know that **inCider** is the fastest-growing Apple*-specific magazine on the market today.

What you might not know is that there are nearly 2 million Apple computer owners out there. And, many of them buy their copies of **inCider** at dealerships like yours every month. They might even be buying it from your competitors. . . .

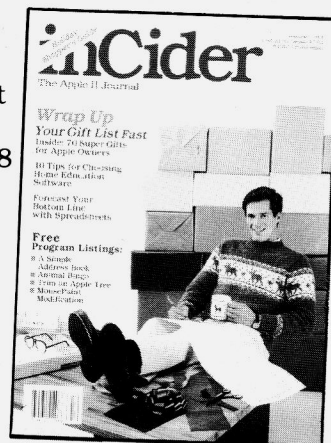
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inCider's Bookshelf

The Skeptical Consumer's Guide to Used Computers (Ten-Speed Press, \$9.95) could save you a bundle. Ed Kahn and Charles Seiter have practical advice on what holds up—the //e—and what falls down—the PCjr. Great illustrations.

"The Cracker," Bill Landreth, steps **Out of the Inner Circle** (Microsoft Press, \$9.95) to reveal the dark world of teenaged phreaks and pirates who plunder America's data banks. A "hacker's guide to computer security" by one who went straight.

They All Laughed When I Sat Down at the Computer (Simon & Schuster, \$16.95) is a light-hearted look at personal computing by *The New York Times'* respected columnist Erik Sanberg-Diment. Witty and wise.

How to Repair and Maintain Your Apple Computer (Chilton Book Company, \$12.95) explains how. Gene Williams has the answers to all those questions about poking into your //e or //c. With photos and instructions.

Bruce Hicks and Sylvia Baron teach **//c BASIC Paint** (Wiley Press, \$16.95), a solid introduction to graphics for readers fluent in BASIC, and a good start in programming for beginners.



Apple archaeologists and other explorers will want to peruse **The Apple CP/M Book** (Scott, Foresman, \$12.95) for a tutorial peek into the operating system's structure, commands, and utilities.

Understanding the Apple //e (Brady Books, \$24.95), Apple Clinic columnist Jim

Sather's latest. Whatever you wonder about the inner workings of your //e, the answer's probably here.

Back to BASIC (Addison-Wesley, \$12.95) explores the history, corruption, and future of the pervasive language created by authors John Kemeny and Thomas Kurtz.

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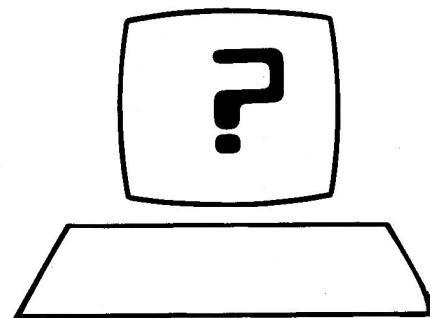
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'Tis the Season



But what about you? What have you been hinting around for? A new printer...selection of software...modem? Maybe you're not

Of course, since it's better to give than to receive, what do you plan to wrap up for your favorite Apple computer fan? We'd like to know. Dial (603) 924-9801 with your modem and answer the survey on our bulletin-board system. After you log on, type **POLL** after the system command to

Please send your responses—by mail or modem—before December 13, 1985. Results will appear in the February issue. ■

- 1) My holiday wish list would start with:
 - a) an Apple IIe enhancement kit
 - b) a selection of hardware (monitor, disk drives, printer, joystick/mouse)
 - c) a software assortment (word processor, games, educational software, graphics package)
 - 2) Considering that a little extravagance goes a long way, I'd like to find _____ under my tree:
 - a) peace and good will
 - b) 100 shares of Apple stock
 - c) an IBM PCjr
 - 3) Sticking to more practical gifts, I'd like someone to give me:
 - a) a modem
 - b) a letter-quality printer
 - c) software
 - 4) I'd give my favorite Apple II owner:
 - a) a modem
 - b) a RAM card
 - c) a word processor
 - 5) As far as practical gifts go, I think the most worthwhile is:
 - a) a membership in a local Apple user group
 - b) a lifetime supply of floppy disks
 - c) a set of Apple II tutorial books
 - 6) If I could give a computer gift to my local school system, I'd donate:
 - a) an enhanced Apple IIe system
 - b) a color monitor
 - c) educational software
 - 7) If I could have my choice of three computer-related items, and dreaming could make it so, my list would include:

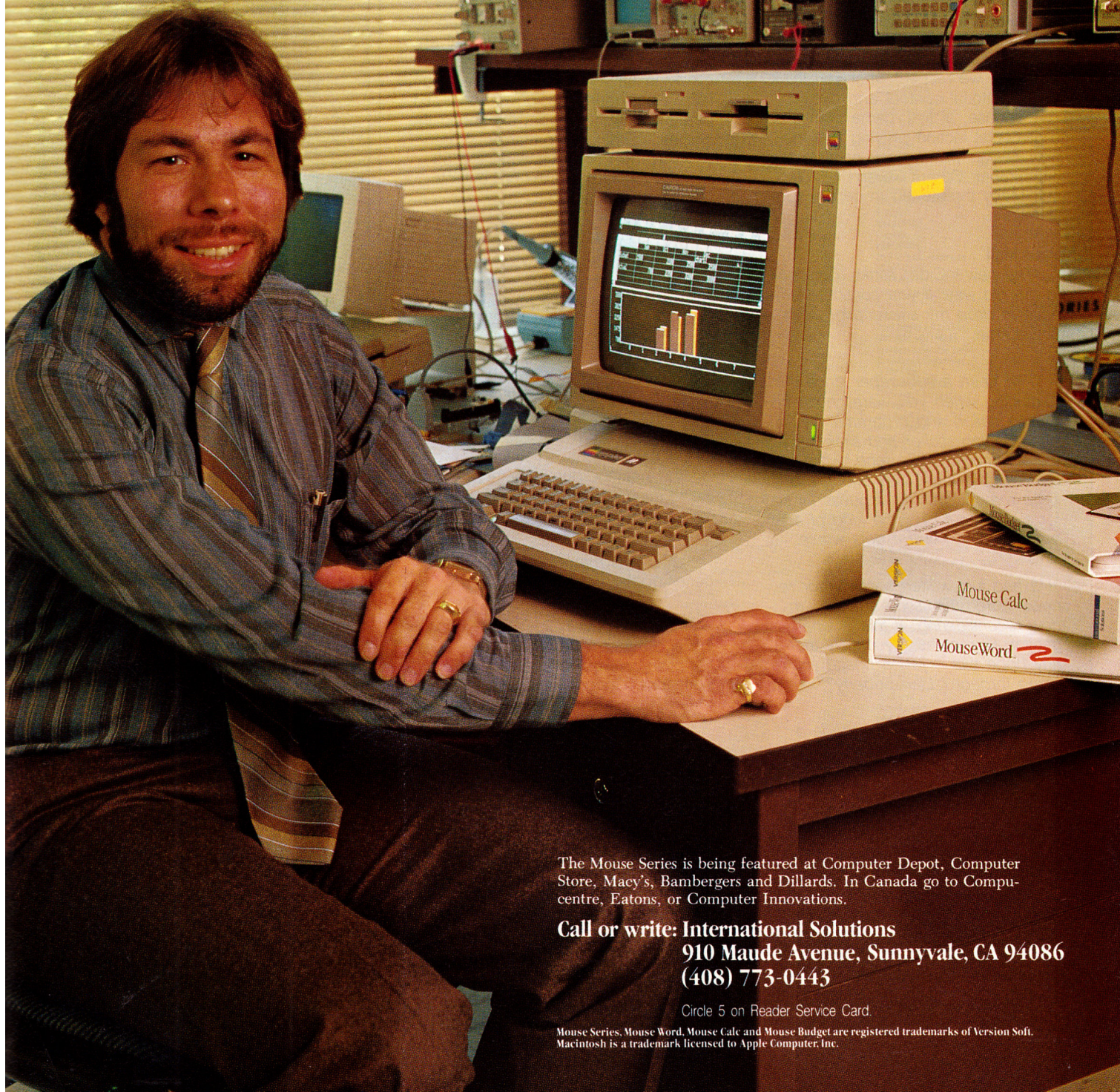
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WE ASKED THE EXPERT

We went to the inventor of the Apple II, the man who helped launch the personal computer revolution, Steve Wozniak. We wanted to know if the Mouse Series™, our new family of software for the Apple II, could bring new excitement to the first industry standard:

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The Mouse Series is being featured at Computer Depot, Computer Store, Macy's, Bambergers and Dillards. In Canada go to Computecentre, Eatons, or Computer Innovations.

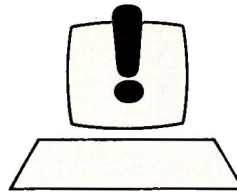
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BACKTALK

Beauty Is in the Eye of the Beholder



We braced ourselves for the results of October's BackTalk (p. 81) when we asked you to scrutinize *inCider's* new look. It's not every day a magazine elicits criticism from its readers. But then, we respect what you think about editorial content and design.

Response, at first, came from a sentimental faction praying that the new design was a hoax or at least an experiment. Others weren't so tolerant. Many threatened to cancel subscriptions.

Hate Mail

"The new inCider stinks. Go back to the old way. If you continue, I may have to drop my subscription at renewal time."

"I've been a subscriber since the beginning when you were chock full of information and programs. You've been getting slicker and slicker since the summer of 1984, and, while I didn't like it, there was enough to keep me subscribing. I guess I'll stay for a while out of some kind of sentimentality, but not if it gets worse."

"I had just written a check for renewal when this issue arrived. I'm now reconsidering. If this is what I'll get for 12 months... yuck! [Is there] any hope this is just a phase you're going through? Like puberty?"

"It looks to me you've made a change for change's sake and not really improved anything. Sorry, but I liked the old format better."

"Your 'professional' look doesn't suit you. Your magazine lost a lot of its readability in the change. To be frank, your magazine lacks the pep it used to have. There's no emotion in those stark black-and-white pages that a farsighted person could read if you slammed his face into it."

Good News

But when the final response was tallied, 52 percent said the new *inCider* sports a clean, professional appearance. The reason: 53 percent cited the easy-to-read sans-serif typeface. Considering design changes, 61 percent thought artwork enhanced the articles; 45 percent preferred screen shots in the review section; and 59 percent found the table of contents helpful and attractive.

"The clean lines and titles at the tops of pages look very nice and professional. This in particular gives the magazine a really fresh, sophisticated look."

"The new inCider is more readable. Art and graphics are okay, but it was always the 'meat' that attracted me, and that hasn't changed."

"The new inCider is even better. I didn't think inCider could be any better, but you improved it. Amazing!"

"inCider is more interesting and of better quality than it was before."

"I find the new inCider more appealing and easier to read. I especially like the crisp, intense, vibrant, true-color illustrations. Congratulations."

"You look marvelous!"

Art Director Donna Wohlfarth appreciates reader opinion. But as she says, "It's not over yet. I look forward to reader comments on the design so we can make *inCider* into the book everybody wants." ■

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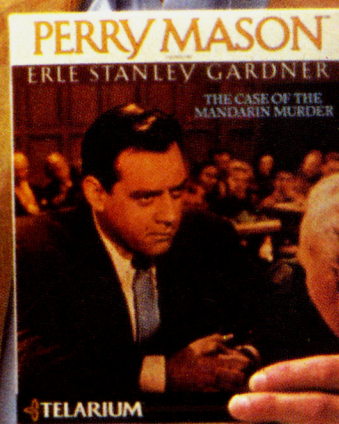
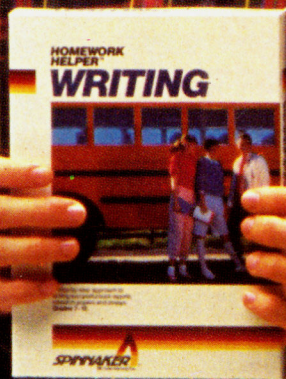
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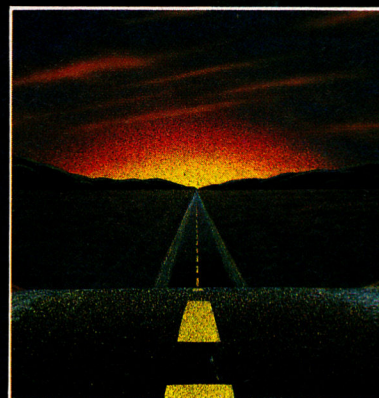
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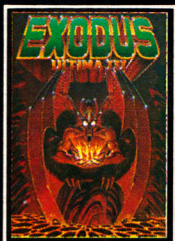
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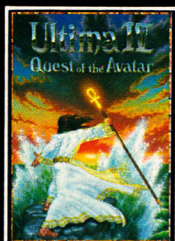


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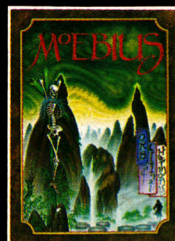
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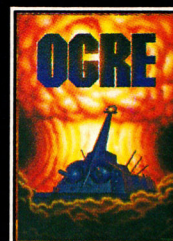
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APPLESOFT ADVISER

Trivial Trivia: Part 2

by Dan Bishop

Trivia addicts, unite! Get out your November *inCider* and follow along in the Trivial Trivia **Program listing** (p. 54) while I take a detailed look at the code. Designing your own trivia game has got to be the most enjoyable way you'll ever find to learn more about random-access disk files.

The Trivial Trivia program is composed of several rather short subroutines (most of them less than 20 lines long) that are tied together through a main program sequence (lines 5-75), a master menu (lines 1000-1090), and one sub-menu (lines 2000-2105). **Figure 1** shows the organizational chart for these subroutines. I identified and sketched into the chart more than half of these modules before I wrote even one line of code. I added the other modules as I needed them.

Data Structures

One of the initial decisions you must make when writing any program is how you will represent the data you use in the program. Whenever you deal with several variables that stand for different values for the same item, such as scores for several players, you should consider using an array representation for your data. For Trivial Trivia, I chose to use five arrays; line 100 dimensions them.

Two of these are simple, linear arrays. NM(i)$ represents the names of the players. Q(i)$ stands for the lines of data that make up a trivia question. Three lines, Q(1)-Q(3) , take care of the question itself, while five lines, Q(4)-Q(8) , handle the five multiple-choice answers the game presents with the question.

I originally envisioned only four data files to represent four categories of questions. Further consideration brought to light the fact that the individual responsible for typing trivia into the data files would be answering his or her own questions.

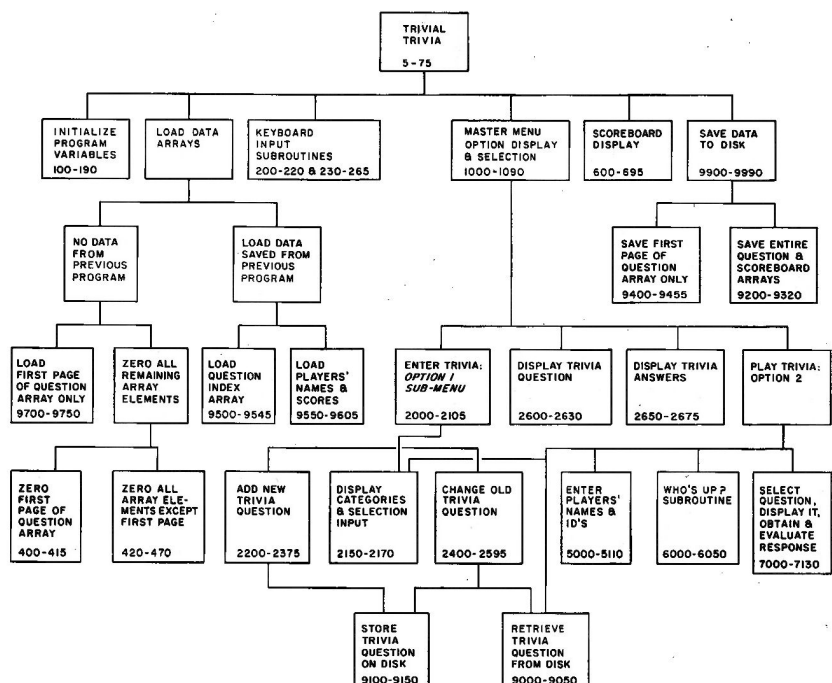
If you've ever wondered what *else* Applesoft can do, try designing your own game of Trivial Trivia.

To get around this problem, I decided to use 12 data files, three for each category. Three players can type questions into the data base. Each of these players' questions is placed into one of the three sets, separate from the questions others enter. When you run the program, the computer cannot draw questions for a player from the same set used to store that player's trivia entries.

Twelve data files require 12 disk file names. Since you use the same four categories for each of the three sets, I decided to set up a file-name array, F(i,j)$, with two dimensions. The first dimension (i) corresponds to the category, while the second (j) refers to the set number within that category. To load the category names into the computer, I used a `READ...DATA` combination within a loop (lines 170-185). The program reads the four category names into the "zeroeth" set elements, F(i,0)$. Appending the set number to the end of the name alters the category name, and the loop in line 180 enters the modified name into the array.

For example, if the first data element is ARTS, the program loads the word ARTS into element F(1,0)$. It

Figure 1. Trivial Trivia organizational chart showing subroutines and their inter-relationships.



loads the word ARTS1 into $F\$(1,1)$, ARTS2 into $F\$(1,2)$, and ARTS3 into $F\$(1,3)$. With this technique, you can specify the file you want to access on disk by assigning appropriate numbers for that question's category (CN) and set (SN): $F\$(CN,SN)$.

The next problem is maintaining each player's running score for each category. To be useful, the program should store two numbers for each player/category: the number of correct responses and the total number of questions attempted. A three-dimen-

sional array works perfectly.

Figure 2 shows a visual representation of this structure. Each horizontal layer, or row, belongs to one player. This row contains eight elements, arranged four across and two deep. Each element represents one category. You can enter the number of correct responses for a given player for each category into the four front elements in that player's row, and the total number of attempted questions into the four rear elements.

Using $SC(i,j,0)$ to represent player

i's number of correct responses for category j, and $SC(i,j,1)$ to represent his or her total number of attempts, you can build very simple loops to display all ten players' scores—80 values in all. Lines 600–695 handle the scoreboard display; most of the code in these lines is for display aesthetics.

I had to solve one final problem before actually writing the program. If the computer were to select questions randomly, how could the program keep players from choosing a particular question more than once? The solution to this problem also requires a three-dimensional array, $QA(i,j,k)$. (See **Figure 3** for a visual representation.) The $QA(i,j,k)$ array has four horizontal layers, or rows, which correspond to the four categories of questions. Its three vertical layers, or sets, run from front to back as columns. It's 47 layers deep (although the program uses only layers zero through 41).

The program uses layers zero and 41 in this array for special purposes. Layer zero contains the actual number of questions currently saved in that particular category/set data file. That is, if ARTS2 has 17 questions, then $QA(1,2,0)$ contains the value 17. Layer 41 keeps track of the number of questions in a given category/set data file that the computer has not yet used. The beginning of the program sets this layer equal to layer zero (lines 450–465). Each time you select a question from that file, the program decreases the appropriate element in layer 41 by one (line 7090). So whenever the computer generates random CN and SN to pick a question from file $F\$(CN,SN)$, it checks $QA(CN,SN,41)$ (line 7040) to make sure it isn't zero. If it is, that indicates that no more questions are available from that category/set file.

Layers one through 40 correspond to the questions in the entire data base. Each question has a corresponding $QA(i,j,k)$. For example, question 15 ($RN=15$) in category 4, set 2, has a corresponding array element $QA(4,2,15)$. The beginning of the program sets all of these elements to zero (lines 420–440). That's 480 data elements set to zero with five lines of code—such is the power available to programmers who use arrays. Then, as the computer calls up each question, the program gives its corresponding array element a value of one (line 7095). Each time the computer generates a new set of random numbers, it checks the $QA(CN,SN, RN)$ element. If it has a value of one,

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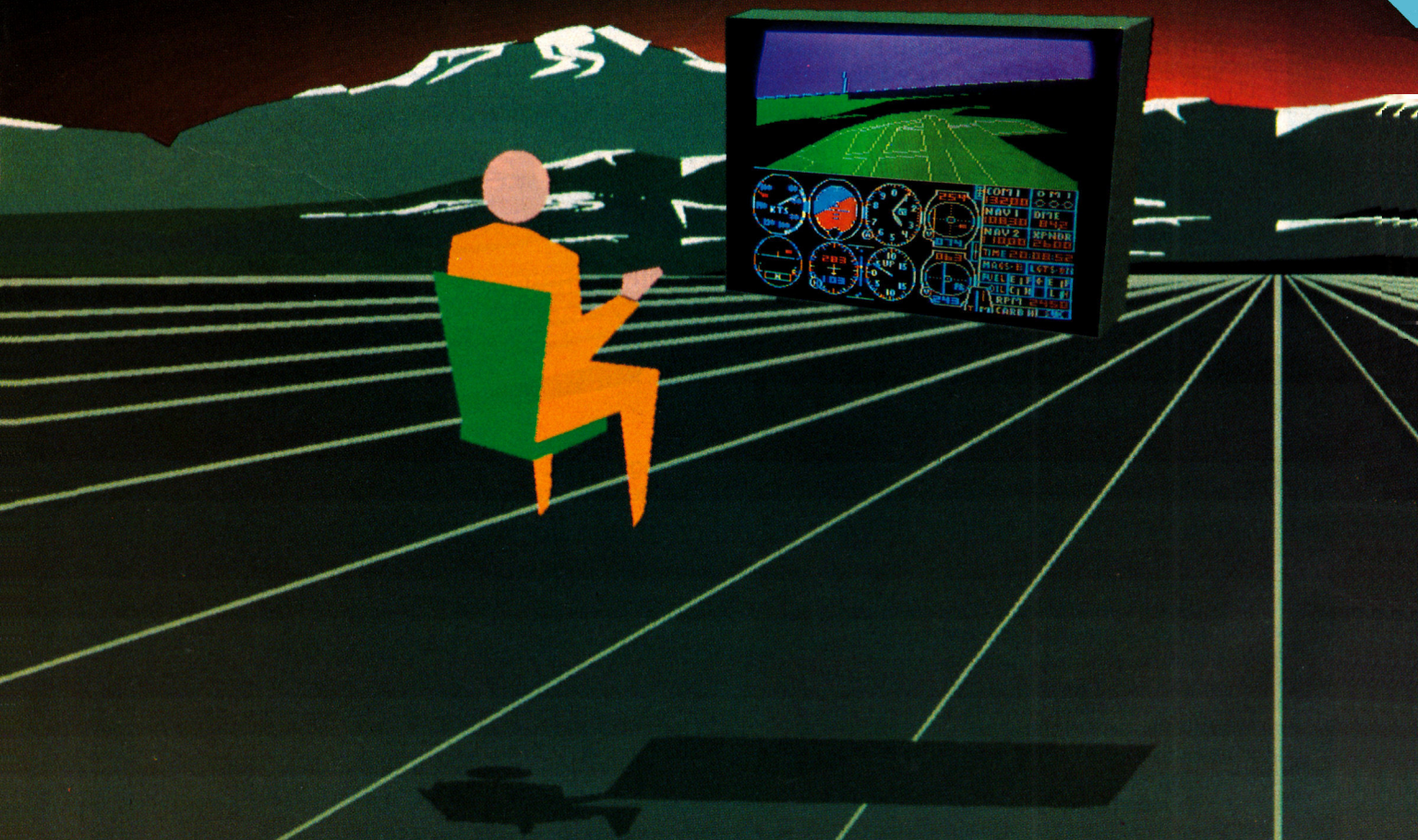
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Figure 2. Trivial Trivia's scoreboard array, dimensioned as SC(10,4,1) to account for ten players (1-10), four categories (1-4), and two layers (zero and one). Note that the zero rows and columns have been ignored for convenience in coding.

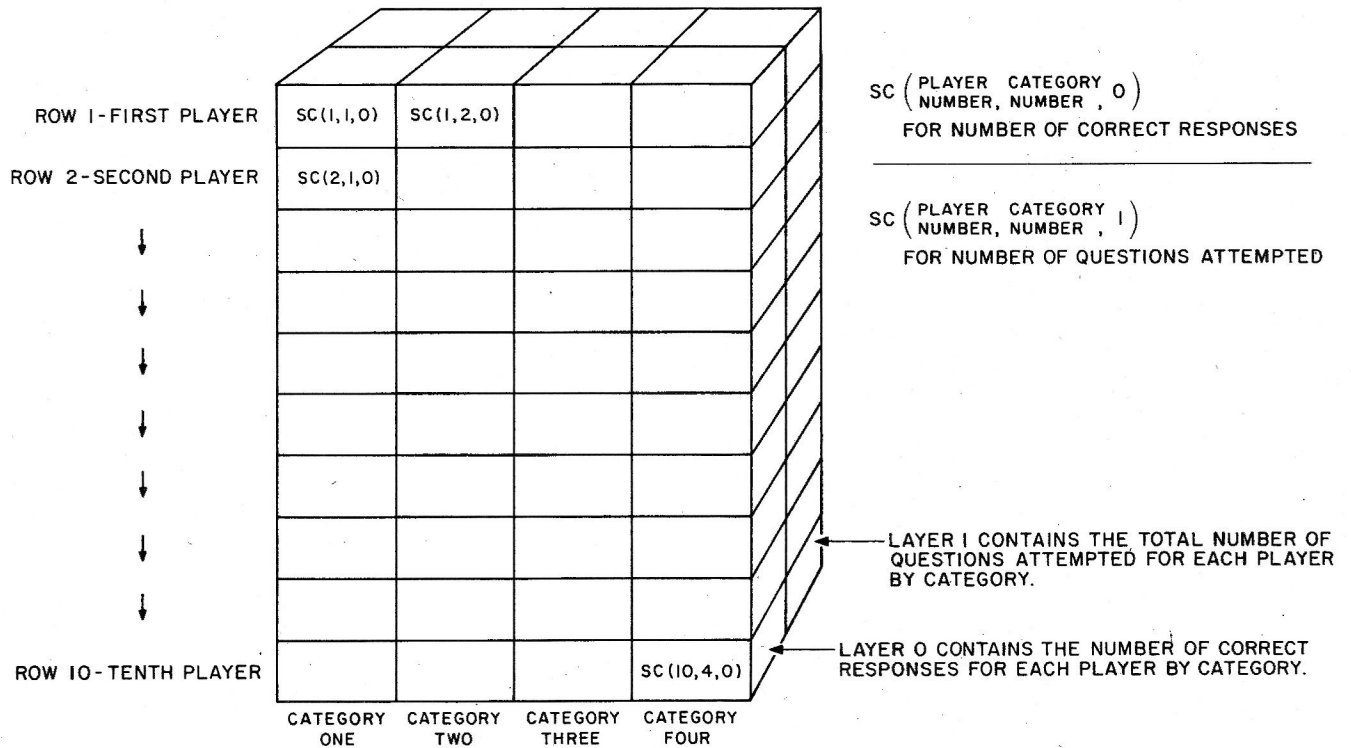
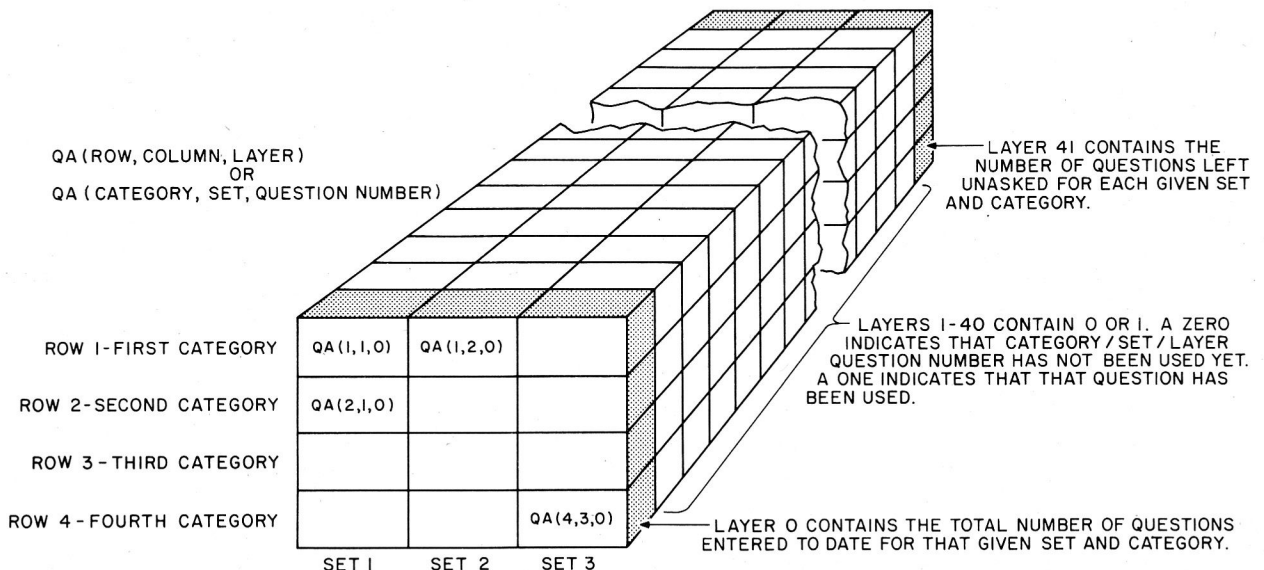


Figure 3. Trivial Trivia's question-index array, dimensioned as QA(4,3,47), although the program uses only layers zero through 41. The zero rows and columns have been ignored for convenience in coding.





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the computer goes back to come up with a different value for RN, and thus a different question. With this design, no question appears more than once during a game.

Disk-File Record Structures

With random-access disk I/O, you must clearly define the structure you want to give each file's records. You need only one such definition for each type of file, but that definition must specify exactly how many bytes you plan to assign to each stored variable (or field). **Figure 4** contains the disk-record structures.

The easiest structure to define is one for the trivia data-base files. Since all 12 files contain the same type of information, you need only one structure definition. By assigning one trivia question/answer combination to each record, and specifying the number of bytes for each line the program will store in that record, you can determine the total size of each record to be 231 bytes, plus 1 for the end-of-record marker, for a total of 232.

The question-index array presents a different problem. Instead of storing a linear array, you're faced here with a three-dimensional array. I decided to store the array elements layer by layer in a record large enough to hold eight complete layers. Since the numbers the program stores never contain more than two digits, I decided to allot 2 bytes for each element. Eight layers then require 192 bytes (plus 1 end-of-record marker byte). These choices are somewhat arbitrary. Applesoft allows up to 239 characters in a string variable, so this presents an upper limit on record size if you transfer complete records into string variables (as I have, using XT\$).

I used a variation of this technique for the scoreboard array, and saved information for five players at a time in each of two records. In this case, again arbitrarily, I chose to reserve 4 bytes for each numeric entry to be saved. Since I wanted to save the total number of players as well, I simply reserved the first 4 bytes from each record to store this value. A little wasted space here avoided some additional coding, which takes up its own space, not to mention extra effort.

Disk Input/Output

I've pointed out in previous columns (see July 1985, p. 68, August 1985, p. 53, and November 1985, p. 52) that you can generalize disk I/O with a few simple lines of code. The

ten lines of BASIC code between 9900 and 9990 in the Trivial Trivia **Program listing** handle all actual disk-access functions from the program. Note the following features:

- 1) Common file-name variable, F\$.
- 2) Common record length, 232. (You could change this to a variable, but in this program the advantage of that would be minimal.)
- 3) WRITE and READ commands specified by the value you assign to a subscript variable, IO.
- 4) Common record-number variable, RN.
- 5) Common data carrier, XT\$.

The subroutines that prepare data for output to the disk (shown by making IO equal to zero at the start) begin by initializing XT\$ to null, then building it up to a full record. The program first converts numbers to strings, then chops them down to two digits, or a single digit and a space. Since the program stores the values in arrays, extensive use of nested loops simplifies the process considerably.

When you use XT\$ to retrieve data from the disk, you must segment the original XT\$ variable at the appropriate places to remove the program variables from it. To do this you use the MID\$() function, which lets you remove a string of characters from a larger string, and specify the number of characters you want to remove and where in the larger string you want the operation to begin.

For example, if A\$ = "HAPPY NEW YEAR", then MID\$(A\$,4,6) is "PY NEW". As before, nested loops provide a means of carrying out this task with minimal code. The trick is to deduce the mathematical relationships that let you use the loop variables within the MID\$() function so that the program excises just the portions you desire at each loop cycle.

Study the examples in lines 9020, 9035, 9535, 9575, 9590, and 9730. Each of these subroutines not only uses XT\$ as the data carrier, but each assigns a value of zero or one to IO, an appropriate file name to F\$, and a value to RN. The program must perform these tasks before it calls the disk-access subroutine at 9900. (Subroutines 9000 and 9100 actually use values you've assigned to RN before the program calls the respective subroutine.)

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Error-Free Data Input

Every program that uses keyboard input should have appropriate built-in error traps to keep bad entries from crashing the program. Many programs include three to ten lines of code after each INPUT statement to handle error trapping, but that's very inefficient. In Trivial Trivia, I've included a single keyboard-input subroutine at lines 230-265 to handle the data-verification process for most of the program's keyboard entries.

Realizing that most keyboard input in this program involves typing Y, N, STOP, or some number within a prescribed range, I've tailored the subroutine to deal specifically with these cases. Flag variable YN is zero unless the question demands a Y or N response, in which case the program gives YN a value of one. If the situation requires numeric entry, the program gives S the smallest allowed value, and L the largest. The program assigns values to either YN or S and L before the GOSUB 230 call.

At line 230, the program initializes the input variable R\$ and another flag variable, QT, before the INPUT R\$ command. After the INPUT R\$ command, the program checks R\$ to see if you've typed the word STOP. Here I've broken a fundamental rule of BASIC: You should never use a GOTO to jump out of a loop or subroutine. Yet here the computer issues a GOTO 40 command if you've typed in STOP. This procedure is justified because lines 40-75 close the program without further ado, so you'll never feel the consequences of GOTO 40. (You can occasionally break the rules of programming, but be sure you know what you're doing and why.)

If R\$ passes the STOP test, the program sets S and L to zero if this is a Y/N question, and checks R\$ for a Y or N response. If R\$ isn't either of these characters, the subroutine gives the flag variable QT a value of one, displays the message INVALID ENTRY...PRESS RETURN, and returns to the calling program. If QT is set, the program loops back to repeat the original question.

If you haven't set YN when the program calls this subroutine, the program assumes that the situation required a numeric entry, with a value from S to L allowed. Using the VAL() function, the program assigns R to the numeric equivalent of R\$. The program then determines whether R is within the allowed range. If it isn't, the subroutine sets QT to one and

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```
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####
```

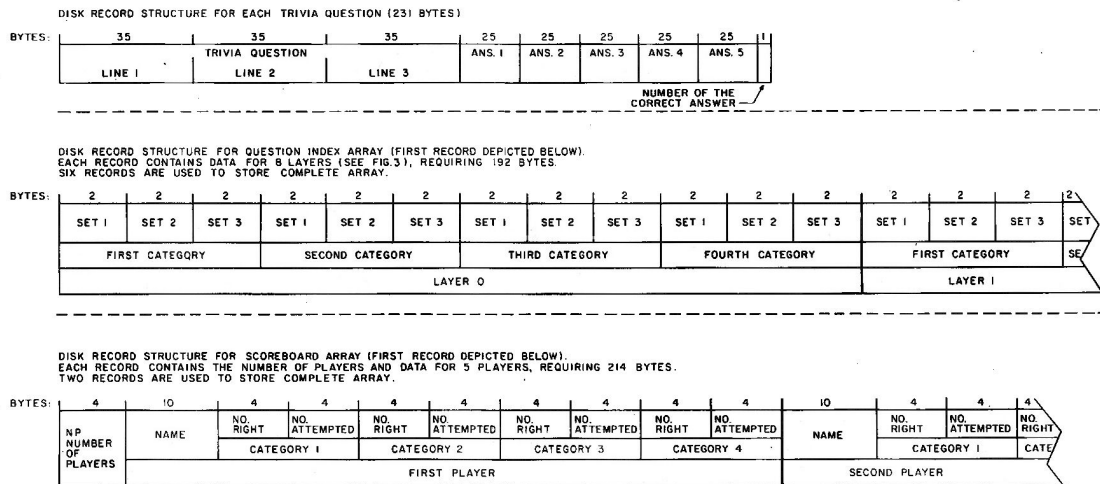
for the traditional INPUT command.

Question Selection

Figure 5 contains the flowchart for lines 7000-7130, the subroutine in

Trivial Trivia that generates a random set number, SN, from a given category CN. It uses the value as the player identification number PN, and employs values in the QA array to determine whether the computer has selected an allowable question for the

Figure 4. Disk-record structures for Trivial Trivia.



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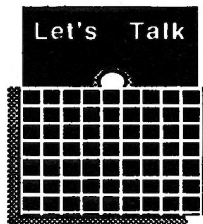
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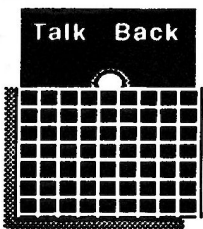
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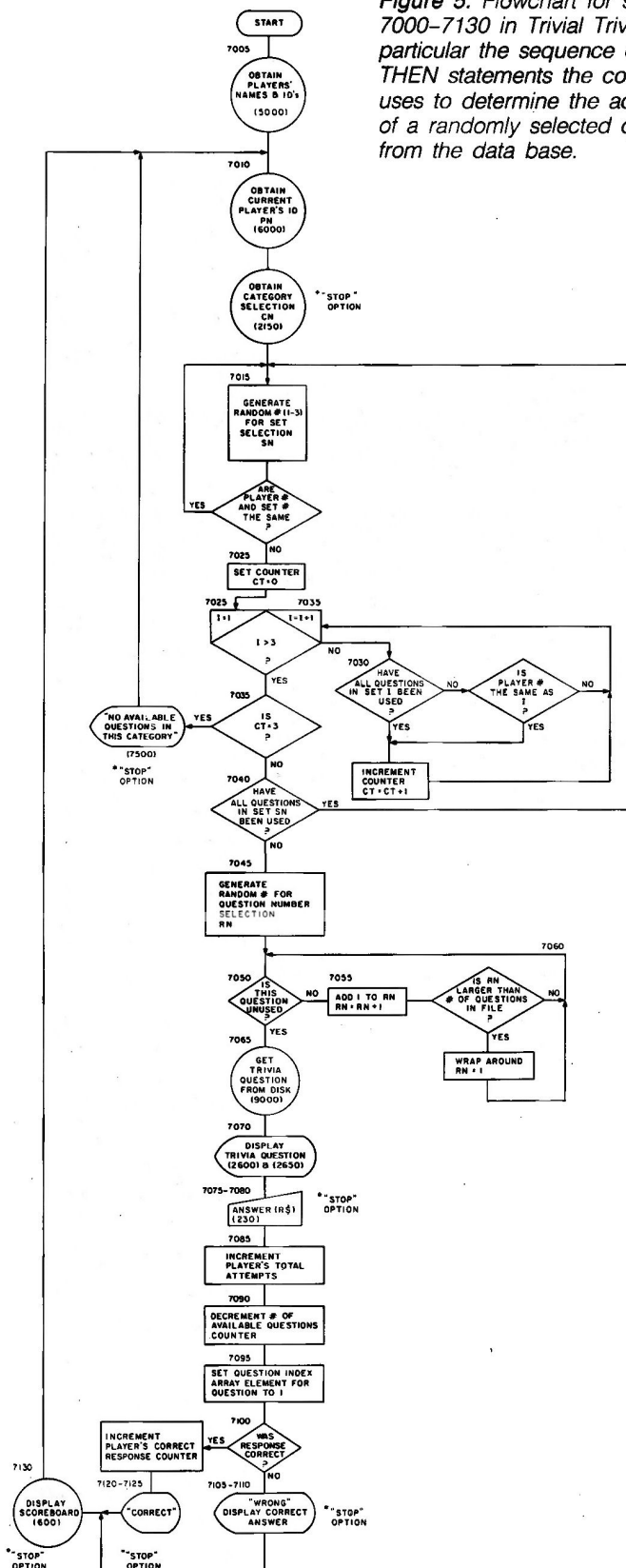


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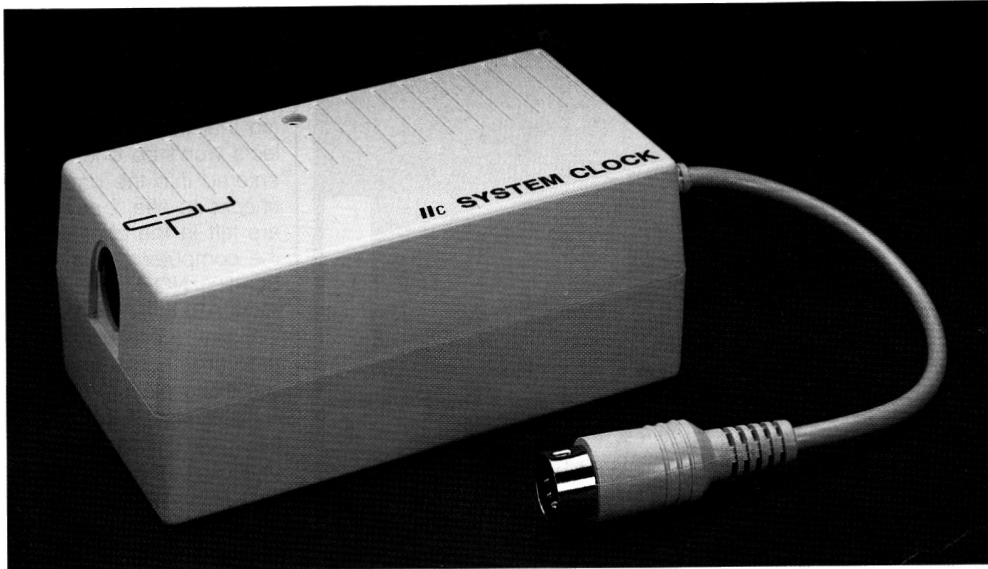
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Figure 5. Flowchart for subroutine 7000-7130 in Trivial Trivia. Note in particular the sequence of IF... THEN statements the computer uses to determine the acceptability of a randomly selected question from the data base.



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given player. The subroutine doesn't let SN have the same value as PN (so that the question the computer selects won't be one that that player entered into the data base). It then checks to see if any usable questions are left in the chosen category. If not, the computer displays the message SORRY, NO MORE QUESTIONS ARE AVAILABLE IN THAT CATEGORY.

If any questions are available, the program checks the question array to see if the players have depleted the selected set. If they have, the program generates another SN and repeats the process described. When the computer has chosen a usable set, the program randomly generates the question number (layer), RN, and checks the QA array to determine if the players have used that question.

If the computer has previously selected question RN, the program checks the next question in that category/set by simply adding one to RN and repeating the process. The new value must not be greater than the number of questions in that set. If it is, the program sets RN equal to one, and effectively wraps around to the beginning of the list.

This little procedure, lines 7045-7060, is a very efficient way to generate random numbers from a list so that they won't reappear. The program uses the RND() function just once. If you were to use the RND() function each time you hit an unacceptable choice, your program would bog down toward the end while it searched for the few remaining numbers allowed. With this routine, if you generate an unacceptable random number, you simply look at the next one until you encounter an acceptable number.

Conclusion

The Trivial Trivia program provides a basis for a working game that requires extensive disk I/O. To this skeleton you can add many more aesthetic elements to enhance the appearance of the scoreboard, menu displays, and question/answer display routines. Tinker with the program; study the code and change it, add to it, improve it. The best way to learn BASIC, once you know the fundamentals, is to play with it, and Trivial Trivia can provide a springboard for hours of enjoyable experimentation. ■

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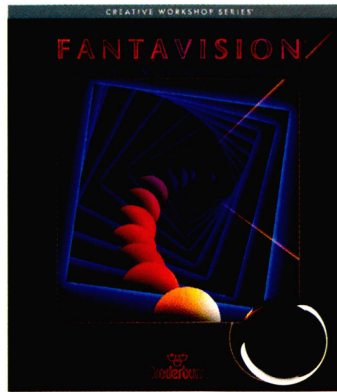
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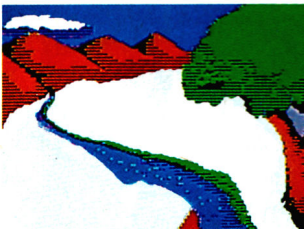
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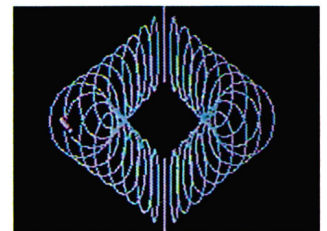
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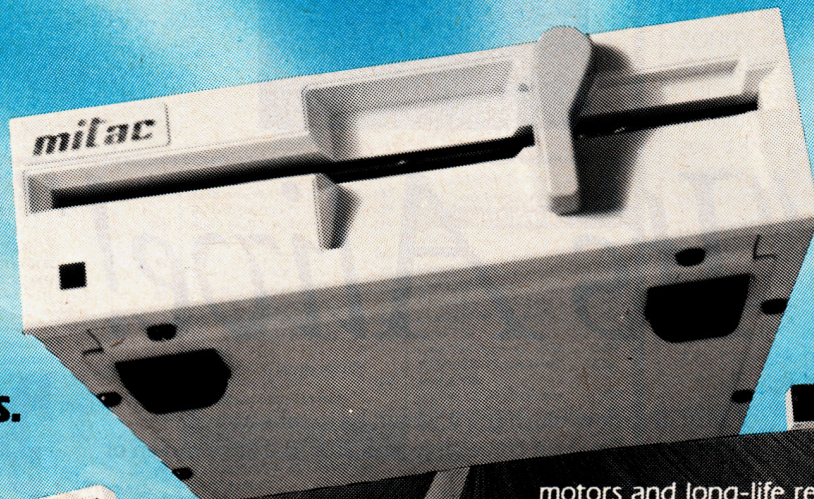

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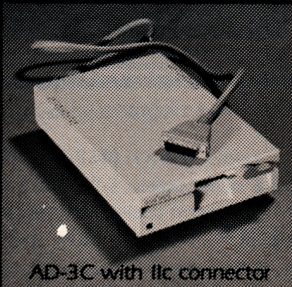
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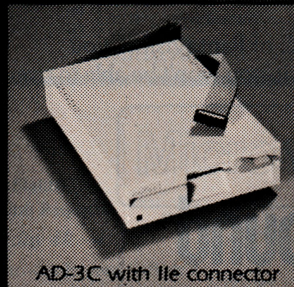
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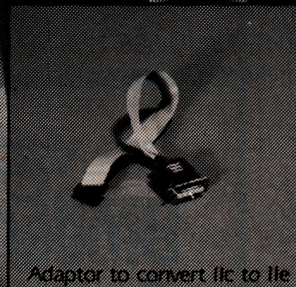
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AD-3C with IIc connector



AD-3C with IIe connector



Adaptor to convert IIc to IIe

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ASK INCIDER

by Bob Ryan,
inCider Technical Editor

If you have a question, our technical editor has the answer. Send your queries about Apple computing to Bob Ryan, Ask inCider, 80 Pine Street, Peterborough, NH 03458.

Math Strings

Dear inCider:

Could you please examine the following program? I've encountered some problems with it:

```
10 INPUT G$
15 G = VAL(G$)
20 PRINT G
```

When I enter the expression 2 + 3 into G\$, at line 10, the printed result in line 20 is 2, instead of 5. Why does this happen? Is there any way I can get the computer to accept a mathematical expression when it prompts me for input?

Albert Lu

Dear Albert:

To enter a mathematical expression via an INPUT statement, you have to either tokenize the input string and modify your program as it runs, or parse the input string to separate the values from the operators. Unless you're very familiar with Applesoft's tokenizing process, I recommend you stick to the second method.

Don't expect the VAL statement in your program to do more than it's designed to do. VAL statements scan a string or string variable and convert all characters, up to the first nonnumeric character, to their corresponding numeric values. In your example, with G\$ = 2 + 3, the VAL statement scans the string from left to right until it hits the first nonnumeric character—the plus sign (+). Then it converts anything to the left of this character to the value stored in G, and printed in line 20.

You have to separate the numbers

from the operator to enter a simple expression like 2 + 3. Using the Applesoft MID\$ function, you can scan the input string for operators that divide numbers, store separate numbers in separate variables, and perform operations on the variables based on the operators. Let me demonstrate this process:

```
10 INPUT G$
15 L = LEN(G$): FILL$ = "": COUNT = 0
20 FOR X = 1 TO L
25 TEST$ = MID$(G$,X,1)
30 IF TEST$ < "0" OR TEST$ > "9"
   THEN 45
35 FILL$ = FILL$ + TEST$
40 GOTO 70
45 COUNT = COUNT + 1
50 IF COUNT = 1 THEN VAR1 = VAL(FILL$)
55 IF COUNT = 2 THEN VAR2 = VAL(FILL$)
60 FILL$ = ""
65 OP$ = TEST$
70 NEXT X
80 IF OP$ = "+" THEN G = VAR1 + VAR2
85 IF OP$ = "-" THEN G = VAR1 - VAR2
90 IF OP$ = "*" THEN G = VAR1 * VAR2
95 IF OP$ = "/" THEN G = VAR1 / VAR2
100 PRINT G
```

This is a bare-bones routine—it won't handle more than two numbers and one operator, it won't check for an "E" that could be part of a number, and it won't trap input errors. But it will give you an idea of how to parse an input string for numeric expressions.

Voluminous Changes

Dear inCider:

Can you recommend a quick method for changing the volume number of a DOS 3.3 disk once the disk has been formatted and filled with files?

John M. Klein
4023 Oxhill Road
Spring, TX 77388

Dear John:

I suggest you use a byte-zap utility to change the volume number of the disk. The volume number is contained on track 17 (\$11), sector zero, byte 06.

80-Column Help

Dear inCider:

I'm a beginner in assembly language, and I'm having trouble making a machine-language subroutine work correctly from one of my BASIC programs. I'm using the subroutine to print messages from my BASIC program to my monitor. The routine works fine in 40 columns, but in 80-column mode, it puts a space between the letters of the message. None of the books I have on machine/assembly language covers this. Can you refer me to any documentation?

Jim Ashford
75 Laiki Place
Kailua, HI 96734

Dear Jim:

The IIe Reference Manual and the 80-Column Text Card Manual should help. These two books explain how to activate and deactivate your 80-column card correctly.

Out of Control

Dear inCider:

I've been working on a large program and using control characters in the file name to partially copy-protect it. Since a few of the control characters are control-J's, the line-feed character, I can't simply move the cursor over the file name in the catalog listing. Is there any way to find out the control characters in my file name?

John May
2001 South 12th Street
Charleston, IL 61920

Dear John:

You'll find a routine to display control characters in a file name on page 151 of the DOS Manual, and page 33 of the DOS Programmer's Manual, both published by Apple Computer. This routine won't reveal a control-H, control-M, control-U, or escape. If that doesn't solve your problem, you'll



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probably need to use a byte-zap utility to correct the file name as it appears on disk. Refer to Beneath Apple DOS, from Quality Software, 21601 Marilla Street, Chatsworth, CA 91311, to find out how you can alter file names on disk.

Do-It-Yourself Pre-Boot

Dear *inCider*:

I recently purchased Peachtree Software's Inventory System, which I run on my IIe with Applied Engineering's Z-80 Plus card, CP/M 4.0, and an Epson FX-80 printer. The program works fine, except that I can get only 80-column output from my printer, not the 132-column output the program requires. Is there a way to format my CP/M program to print 132 columns of type?

Ed Snyder
16032 Mariner Drive
Huntington Beach, CA 90264

Dear Ed:

I've never used Peachtree's Inventory System, so I don't know if you can modify the program to get 132 columns on your printer. I don't think you need to alter the software, though. You just need a pre-boot that will put your printer into 132-column mode before you boot CP/M.

First, boot a DOS 3.3 disk. Then turn on your printer, and, assuming your printer is connected to slot 1, type in PR#1. Finally, type in the following two lines from the keyboard:

PRINT CHR\$(27); "P"
PRINT CHR\$(15)

Remove the DOS disk and boot CP/M. Your printer will now work in condensed mode until you send it new control codes, or until you turn it off.

The Dating Game

In response to "Date-Stamping ProDOS Files" in the September 1985 Ask inCider (p. 120), a number of readers sent in BASIC programs that set the date under ProDOS. For the most part, they felt the manual method was educational, but the whole process is a lot easier if you let a program do it. If you'd like copies of these routines, send a self-addressed, stamped envelope to:

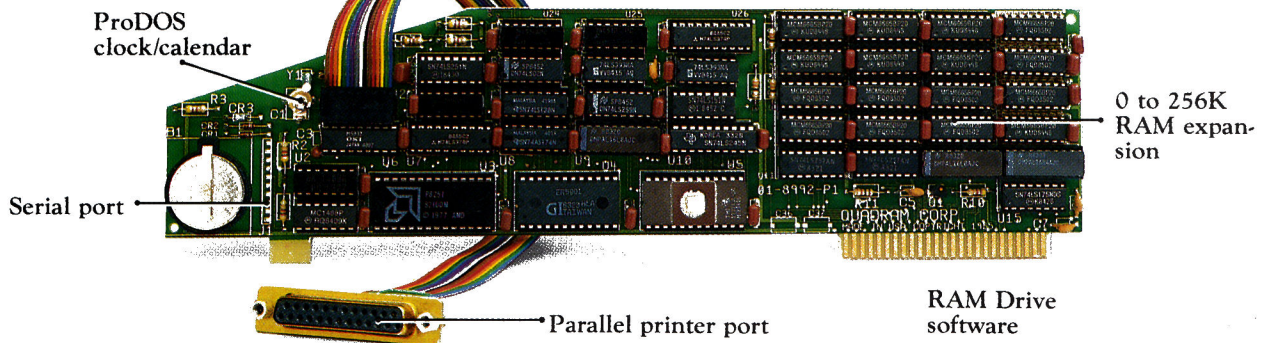
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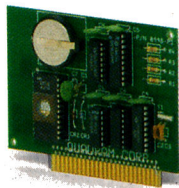
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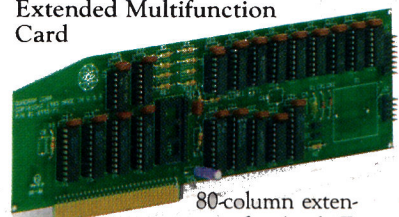
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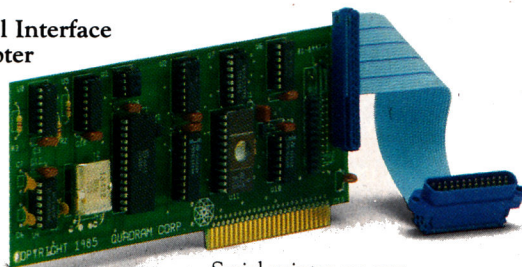


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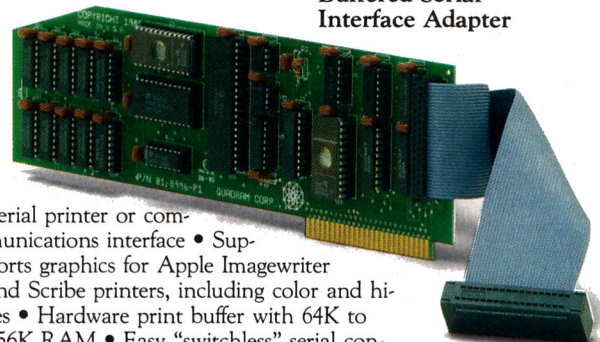
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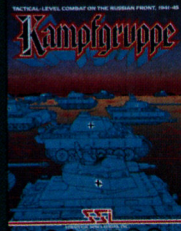
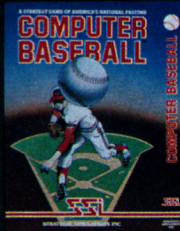
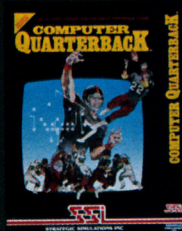
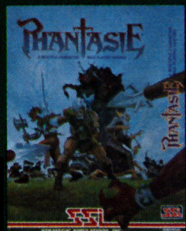
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ASK INCIDER

Please don't send a disk—I'll only supply copies of the listings. I would like to thank Larry Perkins, Earl Hart, and inCider contributors Harold Portnoy, Paul Van Bloem, and William Miller for sharing their routines with me (and you).

Speaking of ProDOS date-stamping, Mary Kurzeka of Practical Peripherals, 31245 La Baya Drive, Westlake Village, CA 91362, informs me that her company is producing an internal clock for the //c. The clock is ProDOS-compatible and provides automatic time- and date-stamping and, as a bonus, text and graphics screen dumps. It seems like a nice addition to a //c. I'm beginning to wonder if it's still accurate to call the //c a "closed" system.

FORTRAN Forever!

Dear inCider:

I have an Apple //e computer and Apple Pascal. I would like to use FORTRAN. Is there any way I can run FORTRAN without having to buy a CP/M board?

Albert Kim

Dear Albert:

Since you already own the Apple Pascal system, you only need to buy a FORTRAN compiler from Apple to run FORTRAN. Apple FORTRAN uses the same operating system (the UCSD p-system) as Apple Pascal. Look for it at your Apple dealer.

PR# Update

In the May 1985 Ask inCider, Robert Bartholemew wrote about his problems with using DOS commands in a program that used PR# commands. I advised him to be sure that a carriage return preceded each DOS command. Carson Eddy, a reader from South Bend, Indiana, recommends you use the PR# and IN# commands as DOS commands instead of Applesoft commands—for example, 100 PRINT CHR\$(4) "PR#1" instead of 100 PR#1.

If this affects the format of your output, you can use the Applesoft PR# and IN commands as long as you re-connect DOS with an immediate CALL 1002. Thanks for the reminder, Carson. ■

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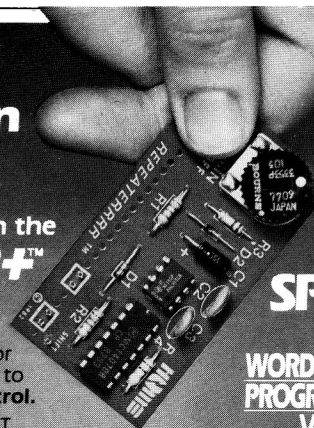
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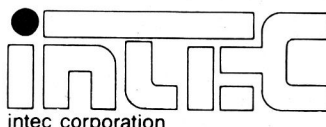
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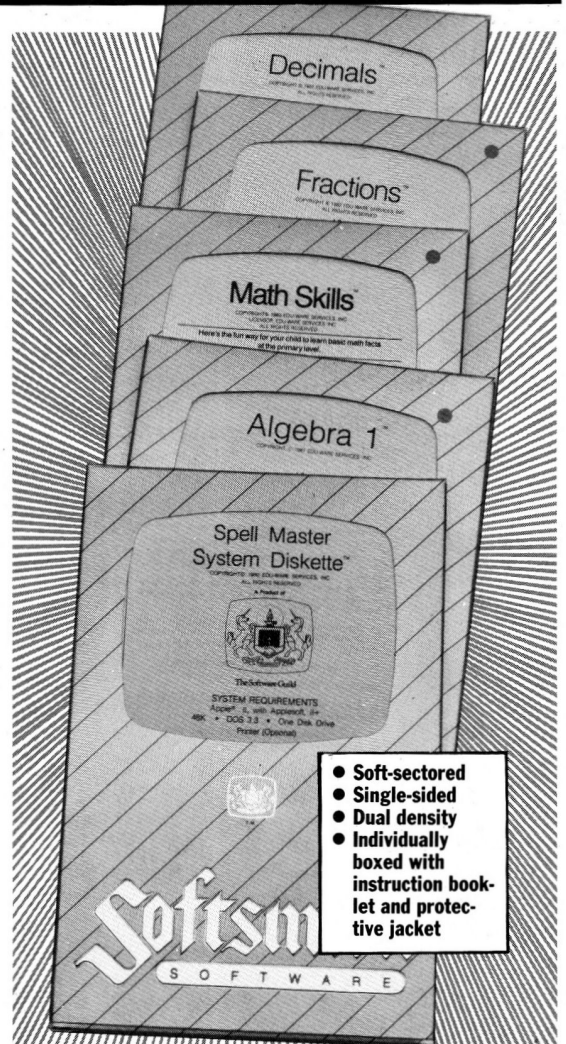
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drive.

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PASCAL PRIMER

Facts on Filer: Part 2

by Tom Swan

Pascal files let you communicate with peripheral devices, save data on disk, talk by modem over a telephone line, print program listings, and more. This month, I'll show you how to use files in your own programs. I'll also explain three more commands in the Apple Pascal Filer.

Declaring Files

Although you can have files of any data type, in this column I'll just concentrate on text files. Programs declare file variables in a VAR section. The following lines, for instance, declare two equivalent text-file variables:

```
VAR
  CharFile : FILE OF char;
  TextFile : Text;
```

A typical file declaration starts with the key words FILE OF followed by the file's data type. CharFile is what it seems—a file of characters. You can also use the predefined identifier, Text, which means the same thing. After declaring a file variable, open it with RESET. This command takes two parameters—a file variable and a file name—as the line below indicates:

```
Reset( TextFile, 'TEST.TEXT' );
```

The file name must be a literal string (as shown above) or a string variable. For example, your program can prompt an operator to type in a file name, then pass that name to RESET:

```
Write( 'Open what file?' );
Readln( FileName );
Reset( TextFile, FileName );
```

In the example above, FileName is a string variable. Because the longest possible file name in Apple Pascal contains 23 characters, declare FileName with its maximum length in brackets as follows:

```
VAR
  FileName : string[23];
```

Writing Text Files

Listing 1, Create, lets you type text into a file named TEST.TEXT. Enter,

Learn how to put text files to work in your Pascal programs.

compile, and run the program, then type in lines of text. Press control-C (also known as <Etx>, meaning "end of text") to tell Create you're done.

Line 10 of **Listing 1** demonstrates the use of the end-of-file Boolean function, eof. Eof becomes True when its file parameter reads a control-C or when it reaches the physical end of a disk file. Eof(input), then, is true after you press control-C, which ends the WHILE loop, and therefore, the program.

The REWRITE in line 5 of **Listing 1** creates a new disk file named

Listing 1. CREATE.TEXT.

```
0: PROGRAM Create;
1: VAR
2:   tf : text;
3:   s : string;
4: BEGIN
5:   rewrite( tf, 'TEST.TEXT' );
6:   writeln;
7:   writeln( '** Enter lines of text.' );
8:   writeln( '** Press control-C to quit.' );
9:   writeln;
10:  WHILE NOT eof( input ) DO
11:    BEGIN
12:      readln( s );
13:      writeln( tf, s )
14:    END;
15:  close( tf, lock )
16: END.
```

TEST.TEXT. If a file with that name already exists, Apple Pascal removes the old file from disk, updating the disk directory when you close and lock the new file, as **Listing 1** does in line 15.

Reading What You Write

Reading text files is similar to writing them. **Listing 2** reads and dis-

plays TEST.TEXT, the file you just created. When reading an existing file, open it with RESET, as shown in line 5; when creating a new file, use REWRITE.

The WHILE loops in the two listings are similar. In **Listing 2**, the loop reads strings from file tf, writes them to the display until it detects the end of the file, and finally closes the file in line 12. Compare that line with the close in **Listing 1**, line 15. If you don't make any changes to a file, you don't have to lock it in the directory. In fact, because Pascal automatically closes all files when a program ends, you don't need line 12 in **Listing 2** at all. I like to close all files, though, as a standard practice.

Standard Files

As you can see in **Listings 1** and **2**, readln and writeln statements have two forms. In line 9 of **Listing 2**, for example, readln has two parameters, tf and s. But, in line 12 of **Listing 1**, readln has a single parameter, s. What's the difference?

Pascal has two standard files, Input and Output. Unless you specify another file, readln and writeln default to those standards. The following statement pairs, then, are equivalent:

```
readln( s );   readln( Input, s );
writeln( s );  writeln( Output, s );
```

You can specify any text file as the first parameter in readln and writeln

Listing 2. READTEXT.TEXT.

```
0: PROGRAM ReadText;
1: VAR
2:   tf : text;
3:   s : string;
4: BEGIN
5:   reset( tf, 'TEST.TEXT' );
6:   writeln;
7:   WHILE NOT eof( tf ) DO
8:     BEGIN
9:       readln( tf, s );
10:      writeln( s )
11:    END;
12:  close( tf )
13: END.
```



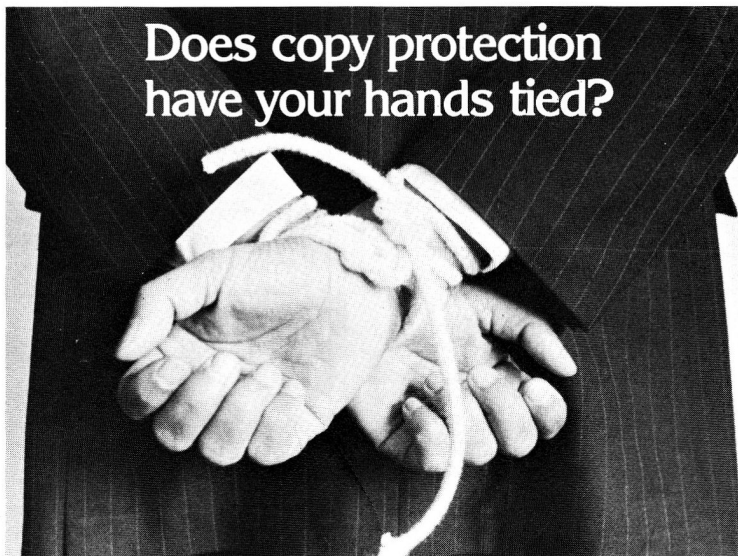
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PASCAL PRIMER

(also in read and write) statements, though. This observation leads to the next program and an important concept: redirection of input and output (I/O).

Redirecting I/O

The simple program MakeText in **Listing 3** serves as a kind of I/O roundhouse. Text comes in through one door—or file—and leaves through another. The program merely switches input and output tracks to make a surprisingly useful utility.

MakeText asks you to supply input and output file names. File names ending in colons, such as CONSOLE: and PRINTER:, refer to devices; others refer to disk files. PRINTER, therefore, is a disk file, but PRINTER: is a device (in this case, the one attached to an interface card in slot 1). **Table 1** lists

as input, then supply a destination name as output. For example, use MAKETEXT.TEXT as input and MAKE-TEXT.BACK as output. In this example, MakeText transfers the contents of the input to the output file, creating a backup of the original disk file.

Still another use for MakeText is to print program listings. Type the name of a text file (CREATE.TEXT, for example) as input. Then, press the return key to use the default output file, PRINTER:. MakeText will now print every line of text in the input file.

That one program can have so many uses is fascinating. But there's no magic here—just the simple idea of I/O redirection at work.

Using the Filer

Finally this month, I'll present three more Filer commands, listed in **Table**

Table 1. Use these volume names to transfer text to and from peripheral devices. CONSOLE: echoes its input, SYSTERM: does not. If a serial card is in slot 3, I/O goes through that card, probably attached to a CRT terminal. Otherwise, Apple Pascal uses its own screen and keyboard.

Volume Name	Description	Interface Slot
CONSOLE:	Screen and keyboard	(3)
SYSTERM:	Screen and keyboard	(3)
PRINTER:	Printer output	1
REMIN:	Remote input	2
REMOUT:	Remote output	2

other predefined device names.

Line 5 of **Listing 3** introduces a new kind of text file, Interactive. An Interactive file has one small, but significant, difference from other text files. When you reset a File of char or text, Pascal reads the first character of the file and sets its internal file pointer to the second character. But, when you reset an Interactive file, Pascal doesn't read the first character. This difference is often important in programs like MakeText that take their input from the keyboard.

Electronic Typewriters and More

Specifying PRINTER: as MakeText's output file turns the program into an electronic typewriter. Just press the return key to use MakeText's default input and output files; MakeText then prints everything you type. Use control-C to end the program.

But that's not all. MakeText also copies files from one disk to another. Enter the name of an existing text file

2. Remember, to start the Filer, type F when you see the main command line at the top of your display. To quit the Filer, type Q.

E(xtended-dir

Type E and a volume name such as APPLE1: or number like #4: to see a directory of files on your disk. As **Figure 1** shows, extended directories start with a volume name, followed by six-column directory entries. Columns show the file's name, its size in 512-byte blocks, the date of its cre-

Table 2. The Filer's directory commands.

E(xtended-dir	Lists a full disk directory
L(ist-dir	Lists a partial disk directory
V(olumes	Lists all on-line devices

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PASCAL PRIMER

Figure 1. Use the Filer's Extended directory command to list a six-column directory, showing the size of all files plus the remaining space on the disk.

APPLE1:					
SYSTEM.APPLE	32	25-Dec-83	6	512	Datafile
SYSTEM.PASCAL	43	25-Dec-83	38	512	Codefile
SYSTEM.EDITOR	47	25-Dec-83	81	512	Codefile
SYSTEM.FILER	29	25-Dec-83	128	512	Codefile
SYSTEM.LIBRARY	39	25-Dec-83	157	512	Codefile
SYSTEM.MISCINFO	1	25-Dec-83	196	192	Datafile
SYSTEM.CHARSET	2	14-Jun-79	197	512	Datafile
SYSTEM.SYNTAX	12	25-Dec-83	199	512	Textfile
< UNUSED >	69		211		

8/8 files<listed/in-dir>, 211 blocks used, 69 unused, 69 in largest

ation or most recent change, its starting block number on the disk, the number of bytes in the last block, and its type.

The file type is not necessarily the same as the one the file's extension indicates. For instance, the file SYSTEM.EDITOR is a Codefile, although it doesn't end in .CODE. File-name extensions are simply indications, not guarantees, of file contents.

Extended directories also show the amount of unused disk space by identifying each available area as <UNUSED>. Figure 1 shows 69 unused blocks, or 35,328 bytes available to store files.

The last line of a directory displays general information. The 8/8 at the bottom of Figure 1 tells you this directory shows eight out of eight files. If you use a wild card, though, as in #5: =.TEXT to list a partial directory, you might see a fraction like 5/12 indicating a listing of five out of 12 files. The last line also shows the total number of used and unused 512-byte blocks and the size of the largest unused space.

To print a directory or store it in a text file, enter a comma and file or device name. For example:

Dir listing of what vol ? APPLE2:,PRINTER:

prints a directory of volume APPLE2:. You could replace PRINTER: with DIR.TEXT, or any other name ending in .TEXT, then edit that file the same way you edit other text files.

L(list-dir

This command operates similarly to the much-preferred E(xtended-dir command. The only differences are that it lists an abbreviated three-column directory, and it doesn't show unused disk areas.

V(volumes

Type V to list all volume numbers, names, peripherals, and disks in your

computer. Figure 2 shows the volumes in my system; volumes 9-12 reference a hard-disk drive, but in another system, they might refer to additional floppy disks.

A number sign, #, to the left of a volume name indicates a block-structured device, almost always a disk drive. Otherwise, this volume is a character device. You can transfer .TEXT files to character devices, but you can't ask for directories of them.

At the end of the volume listing, the Filer shows the current root and prefix volume names. After you boot a disk, these names are the same. They might be different, though, if you used the P(refix command to change the prefixed volume.

Pascal News

Several people wrote asking about the differences between Apple Pascal 1.1 and 1.2. First, let me reassure everyone that you can use either version to type in and run all programs in this column. The two versions have no differences in syntax.

The main advantage of version 1.2 is its ability to use the additional memory on 128K Apple //e computers. This gives you a lot more

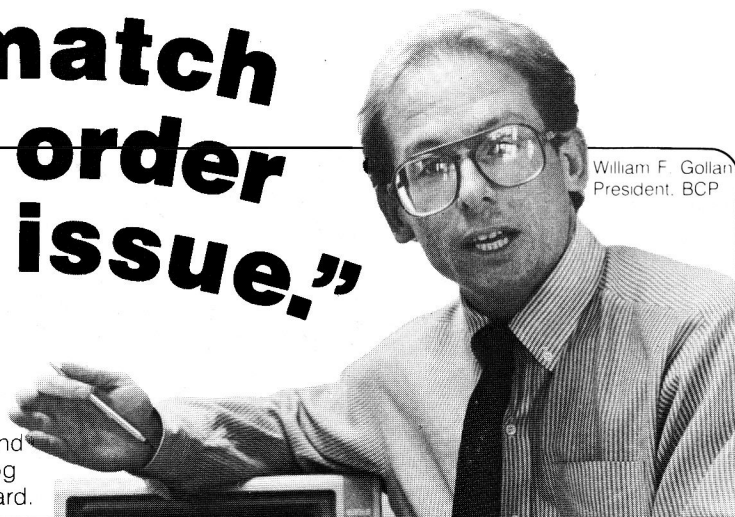
Figure 2. The Filer's V(volumes command lists your Apple's peripherals and disk volumes. It also shows the root volume—the one with which you booted—the current prefix, set with the Filer's P(refix command.

Vols on-line:

1 CONSOLE:
2 SYSTEM:
4 # APPLE1:
6 PRINTER:
9 # HOT000:
10 # H1T000:
11 # H2T000:
12 # H3T000:
Root vol is - APPLIED:
Prefix is - APPLIED:

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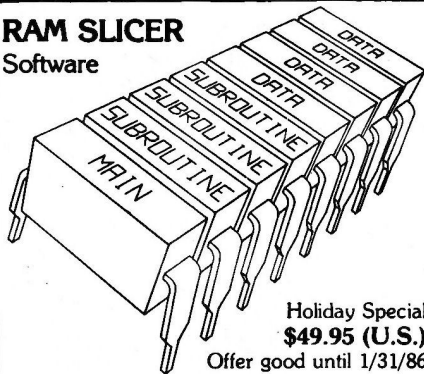


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PASCAL PRIMER

space for compiling and running programs—more than you'll need for any examples I plan to print here.

Another advantage is an additional 32 program segments. Segments, a subject I'll explore in a future column, offer one way to divide large programs into modules. Apple Pascal stores segments on disk, loading only those it requires at one moment or another.

Finally, Apple fixed several bugs and made other minor enhancements in version 1.2, all of which the *Apple Pascal 1.2 Update Manual* lists.

Sometime around the summer of 1984, Apple announced a \$75 upgrade from 1.1 to 1.2. Unfortunately, that offer has now ended; to upgrade and receive the new manual, you have to purchase a brand-new system. That, Apple's new product manager tells me, is official policy.

Next Month

In the next column, I'll continue with more Filer commands, and explain how to use Pascal's file-handling procedures, Get and Put. ■

Tom Swan is the author of the Apple Pascal series, Pascal Programs for Business, Pascal Programs for Games and Graphics, and Pascal Programs for Data Base Management, published by Hayden Book Company. Address correspondence to Tom at P.O. Box 206, Lititz, PA 17543.

Listing 3. MAKETEXT.TEXT.

```
0: PROGRAM MakeText;
1: CONST
2:   DefInName = 'CONSOLE';
3:   DefOutName = 'PRINTER';
4: VAR
5:   InFile, OutFile : Interactive;
6:   InName, OutName, s : string;
7:
8: PROCEDURE GetName(   Message : string;
9:                     VAR Name : string;
10:                    Default : string );
11: BEGIN
12:   writeln;
13:   write( Message, '? [', Default, ' ] ');
14:   readln( Name );
15:   IF length( Name ) = 0
16:   THEN Name := Default
17: END; { GetName }
18:
19: BEGIN
20:   page( output );
21:   writeln;
22:   writeln( 'Make text' );
23:   writeln;
24:   GetName( 'Input file', InName, DefInName );
25:   GetName( 'Output file', OutName, DefOutName );
26:   reset( InFile, InName );
27:   rewrite( OutFile, OutName );
28:   writeln;
29:   WHILE NOT eof( InFile ) DO
30:   BEGIN
31:     readln( InFile, s );
32:     writeln( OutFile, s )
33:   END;
34:   close( OutFile, lock )
35: END.
```

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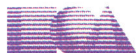
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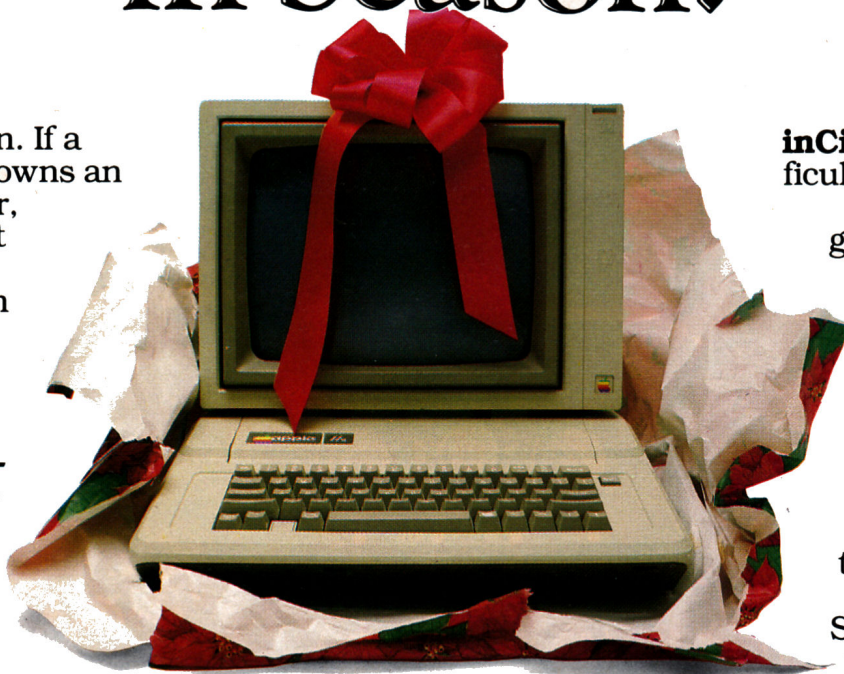
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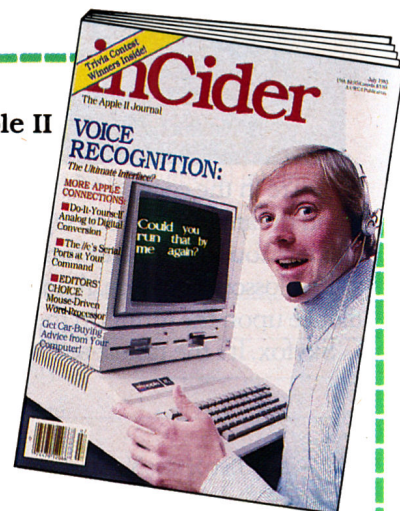
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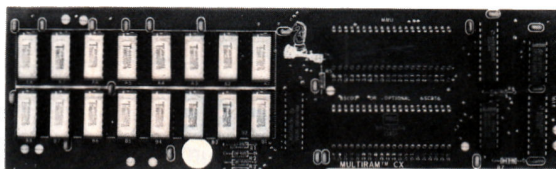
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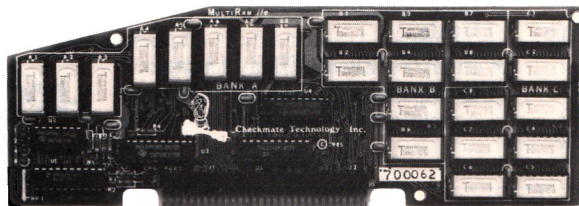
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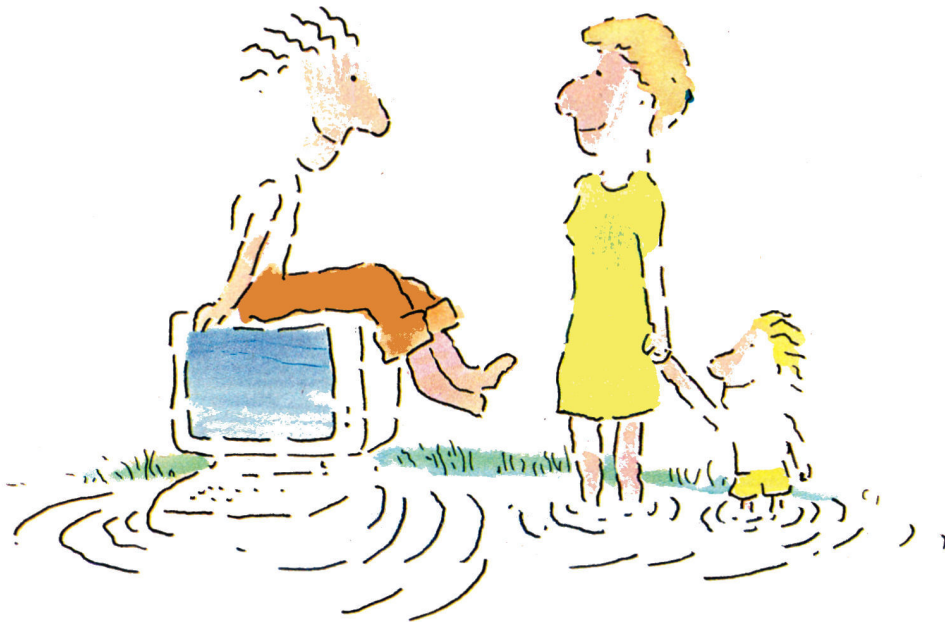
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-Brad Baldwin, InfoWorld Magazine

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Circle 30 on Reader Service Card.

by Jim Sather

The Apple Clinic is a forum for discussing Apple II hardware and related subjects. If you have questions or answers, or want to make a statement, write to Jim Sather, Apple Clinic, inCider, 80 Pine Street, Peterborough, NH 03458.

More Trains

I'm an *inCider* subscriber and a regular reader of your column, and saw C. de Gier's letter in your August issue. Our magazine, *Model Railroader* (Kalmbach Publishing, 1027 North Seventh Street, Milwaukee, WI 53233) has been running a series on building a C/MRI (computer/model-railroad interface). It began in our February 1985 issue and is scheduled to conclude in February 1986.

Installments already published provide detailed instructions on interfacing with a number of home computers, including the Apple II, II Plus, and IIe. The series will conclude with articles on two major model-railroad-software applications: computerized cab control and computer-driven trackside signals.

Dr. Bruce Chubb, vice president of engineering design at Lear-Siegler's Instrument Division in Grand Rapids, Michigan, is the author of this series. Chubb is a model-railroad hobbyist of long standing, and has written many articles for *Model Railroader*, as well as a book on model-railroad operation that our company publishes. His own model railroad is interfaced with a Heathkit H8 computer, using more than 200 discrete input and output lines.

Andy Sperandeo
Associate Editor
Model Railroader

Several other readers wrote to recommend the Model Railroader series. The introductory article in the February 1983 issue gives an overview of the C/MRI task and a general description of Dr. Chubb's C/MRI. I think this series will greatly interest anyone desiring to interface a computer to several devices, whether these devices are part of a model railroad or not. Incidentally, an April 1983 article in this series mentions an overview of a computer-controlled power-routing and signaling system.

Dr. Chubb presents a system based on a multiple-connector I/O motherboard and a universal bus adapter that provides signal buffering and power isolation between the I/O motherboard and the controlling computer. The motherboard hosts a number of 24-channel I/O cards, each of which can access the buffered address bus and data bus of the controlling computer. A specially designed adapter connects the controlling computer to the bus extender. Chubb promises adapter designs for slotted Apple (not IIc), Commodore, IBM PC, and Radio Shack computers. The Apple adapter simply plugs into one of the peripheral slots.

I had never seen Model Railroader before, but it's a fascinating magazine, cover to cover. Some of these people are building their trains from scratch—home-brewed micro choo-choos. An Apple owner with time on his or her hands could really have some fun with that.

Return to Revision-A?

I bought my Apple IIe in December 1983. Now I want to upgrade to 128K so I can use double-hi-res graphics. I've read that I must have a Revision B motherboard in my computer to use double hi-res. How can I tell if my computer has this board?

Chris Hixson
Port Charlotte, FL

Comparatively few Rev-A motherboards have been sold, so it's unlikely that one purchased in December 1983 was a Rev-A. I bought my Rev-B Apple IIe in April 1983. Remove the cover from your Apple and look at the numbers printed near the back. If your numbers are 607-0164-A and 820-0064-A, you have a Rev-A motherboard. If they're 607-0164-B and 820-0064-B, you have a Rev-B motherboard. The 820 number is the part number of an unpopulated motherboard, and the 607 number is the part number of a populated motherboard.

At some point in 1985, Apple changed the part numbers to 607-0187-A and 820-0087-A without making any major operational change. Everybody still refers to the current motherboard as the Rev-B motherboard, even though it has an A part number.

Franklin 80-Column Card

I recently upgraded my Apple IIe to an extended 80-column card from the standard 80-column card (both from Apple). Can I use this card in a Franklin ACE 1000? I was told I couldn't, but the Apple dealer's explanation wasn't too clear or convincing. If I can't, why not?

Rob Klingsten
Howell, MI

You can't. The Apple IIe 80-column card resides in the Apple IIe auxiliary slot, which is different electrically and mechanically from the peripheral slots. These cards have 60 pins instead of the 50 pins found in the peripheral slots of Apples and Franklins. No slot in an ACE 1000 will accept a card designed for the Apple IIe auxiliary slot. To my knowledge, no computer in production except the Apple IIe will accept such cards.

Converting to Extended 80-Column

I have an Apple IIe and a regular 80-column card (not extended). Can I inexpensively convert it to an extended 80-column card to get 128K and double-hi-res graphics?

Erik Moon
Bloom, MN

Converting the 1K Apple IIe RAM card to a 64K card is both inexpensive and simple. Fortunately, it's even cheaper and simpler just to buy a new 64K card. Current Apple magazines advertise a variety of 64K cards (extended 80-column cards) priced at less than \$100. The cheapest one I

find this month is a no-namer available from Memory Plus Distributors for \$65 plus \$3 shipping. If you want to convert instead of buying a new card, a conversion kit is available from Caribbean Computer Sales for \$99.95 plus \$3 shipping.

The conversion kit is an eight-chip PC board that plugs into IC sockets on Apple's 1K card. The 64K card is a ten-chip PC board that plugs into the auxiliary slot. The products, therefore, cost about the same to manufacture and should be priced about the same. The reason the 64K RAM cards are priced so competitively is that the market for auxiliary-slot RAM cards is huge, with numerous manufacturers from which to choose.

Configuring Apple IIc Ports

I recently had trouble sending instructions from my Apple IIc to my Imagewriter. I tried to create page breaks when listing BASIC programs. I had to send 134 control characters to my Imagewriter by first booting the System Utilities disk and then changing the configuration of port 1 to "do not insert CR."

Is there any way to reconfigure port 1 without booting the System Utilities disk? It would certainly be easier if you could combine a simple program with other programs instead of swapping disks. Thanks for your help in this matter.

Gordon Cumming
St. Catharines, Ontario

To reconfigure port 1, first type `PRINT CHR$(4);"PR#1"`. Then type `PRINT CHR$(9);"K"` to disable automatic line feed after carriage return, and, finally, type `PRINT CHR$(9);"L"` to enable automatic line feed after carriage return. You can find these and other control-I port-1 configuration commands on page 131, volume 1 of the Apple IIc Reference Manual. No Apple IIc owner should be without one. You can purchase the two-volume reference manual for \$50 at any Apple dealership worth its salt.

Product Information

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Imagewriter and Grappler Plus

I'm a novice Apple IIe user having trouble with my Imagewriter printer and Grappler Plus printer interface. I can't get commands like IGR (rotated graphics dump) to operate. I don't know if it's the way I'm entering these commands (control IGR, control-IGR) or if the trouble is my printer. How should I set my DIP switches for my system?

David A. Swain
Cottage Grove, MN

According to an addendum to the Grappler Plus manual, set Grappler DIP switches 1, 2, and 4 off and switch 3 on. Set printer switches SW1-6, SW1-7, SW2-6, and SW2-7 closed and SW1-8, SW2-2, and SW2-5 open. To get the Grappler to generate a rotated dump, the computer must send the code for control-I followed by the code for the letters GR. `PRINT CHR$(9);"GR"` should do the trick. If not, your printer/Grappler combination has a problem. ■



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SWITCH-A-SLOT



Designed by Joy George

The **SWITCH-A-SLOT** is an expansion chassis, which allows the user to plug in up to four peripheral cards in one slot. One of these cards is selected for use, and *only* that card draws power.

This product is especially useful where the software requires the printer to be in a particular slot, and the user wishes to choose between two or more printers.

SWITCH-A-SLOT and **EXTEND-A-SLOT** work well with most slow to medium speed cards, such as modems, printers, clock, music, etc. They are not recommended for high speed data transfer devices such as disk drive controllers, alternate processor, and memory cards.

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The **EXTEND-A-SLOT** brings a slot outside your APPLE™, allowing an easy change of cards. The 18" (45cm) cable is long enough to allow placement of the card in a convenient location. The high quality connectors are gold plated for reliability.

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SLOT 3 CLOCK™

Designed by Chuck Shaffer

The **SLOT 3 CLOCK** will plug into any slot of the APPLE II, II+, or IIe. The main feature is that, unlike most cards, it can plug into slot 3 of the IIe *without interfering* with the operation of the Extended 80-column card. **PRODOS™** is fully supported, and the card is **APPLESOFT™** compatible. Installation software and a long-life **DURACELL™** lithium battery are included.

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PROMGRAMER™

Hardware design by Bob Brice

Software by Bob Sander-Cederlof

The **PROMGRAMER** is an inexpensive **EPROM** (Erasable Programmable Read Only Memory) programmer for the APPLE II, II+, and IIe computers. The unit plugs into any slot of the computer, and allows the user to program any standard 5 volt, 27 series **EPROM**. Although not intended as a production tool, the ease of use allows rapid programming, copying, duplication, or modification of **EPROMs**.

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Paddle-Adapple

The **PADDLE-ADAPPLE** is a game plug expansion adapter that plugs into the interior game I/O socket, and is designed to operate in one of two modes. In the first, it allows you select between one of two devices, such as Koala Pad™ and joystick. The device is selected by the flip of a switch. In the second mode, the **PADDLE-ADAPPLE**, with appropriate software, allows the use of two joysticks simultaneously to allow use with games such as **ONE-ON-ONE™** and **ARCHON™**.

There are three versions to adapt to any combination of the newer type APPLE connector (the 9-pin 'D' subminiature), or the older 16-pin plug.

- The **PADDLE-ADAPPLE** has two 16-pin sockets.
- The **PADDLE-ADAPPLE COMBO** has one 'D' subminiature and one 16-pin connector.
- The **PADDLE-ADAPPLE 'D'** has two subminiature 'D' (9-pin) connectors.

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The 9-16 adapter permits the use of most 16-pin I/O devices with the APPLE IIe or IIc. Plugging this adapter into the subminiature 'D' connector allows the use of 16-pin device, such as the **PADDLE-ADAPPLE**, paddles, joystick, 16 pin Koala Pad™, etc. The only limitations are those devices that use the annunciators or the SC040 strobe. **NOTE**—the IIc does *not* support two joysticks.

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16-9 Adapter for APPLE II and II+

With this adapter, owners of early APPLES can take advantage of the newer 9-pin game products, such as paddles, joysticks, **MUPPET LEARNING KEYS™**, etc. **NOTE** — If you have more than one game I/O device, consider purchasing our **PADDLE-ADAPPLE COMBO** or **PADDLE-ADAPPLE 'D'** instead.

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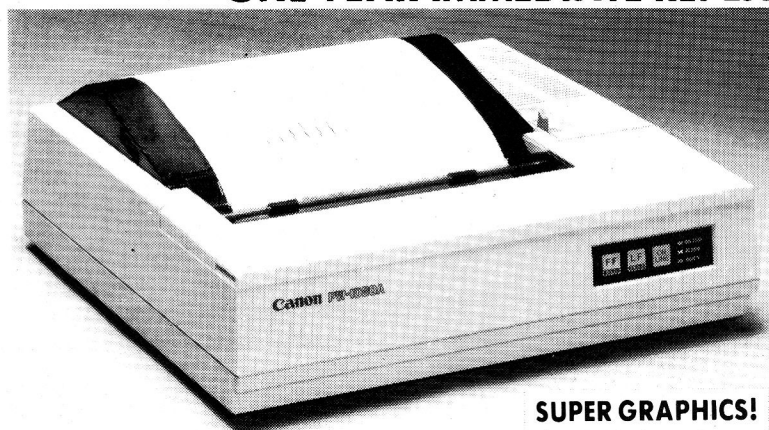
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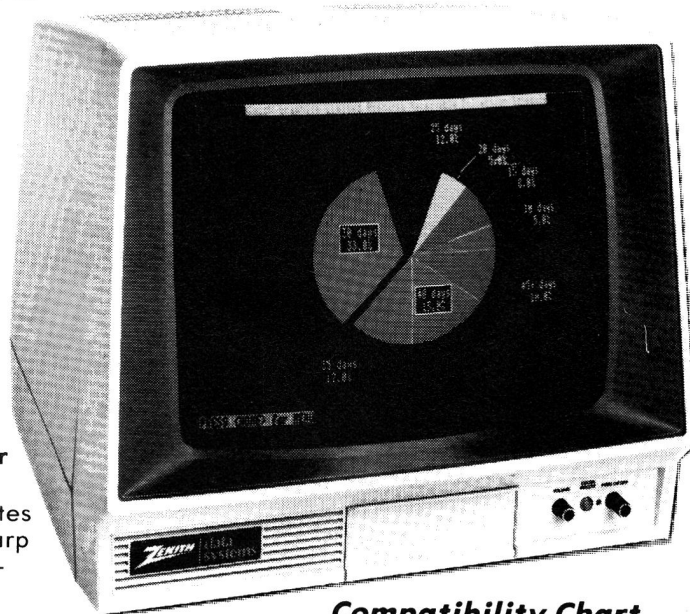
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Commodore 64	Composite
Commodore Vic-20	Composite
TI 99/4	Composite
Atari 800	Composite
Atari 1200	Composite
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RIGHT OF ASSEMBLY

An Assemblage of Assemblers

by Roger Wagner

Last month, I presented a simple machine-language program (see **Listing 1**) that put the letter A on the text screen. I'll quickly review the program to summarize some of the important points presented so far.

In **Listing 1**, created using the Monitor LIST command, the numbers at the far left are the memory addresses at which you find the various bytes of the machine-language program. The bytes themselves, indicated by the hexadecimal numbers in column 2, are the actual machine-language program, and are referred to as the *object code* of the program. The last column of information is referred to as the *source code* for the program, and is usually created using an *assembler*.

The individual commands that make up each line of the source code are called *mnemonics*. An *assembly-language* program is created by entering lines of these mnemonics, along with other information, into an assembler. The assembler then translates the mnemonics into the appropriate bytes to create the object code, and stores this in memory. You usually save both the source and object code as disk files for later use. Use the object code (reload it from disk) when you desire the actual program, and the source code when you want to make a change in the program.

Using an Assembler

A number of assemblers are commercially available for the Apple and virtually every other computer in the world. For the Apple, popular assemblers include Apple Computer's own ED/ASM (also called the DOS Toolkit Assembler), the S.C. Macro Assembler, and the Merlin and MerlinPro assemblers. The public domain also supplies a number of assemblers. You can best find these by checking with the librarian of your local user group.

Discover how assemblers work and how to use subroutines in your assembly-language programs.

An assembler's main purpose is to take the mnemonics you enter and translate them into the proper hex bytes (called opcodes) that make up the machine-language program. All assemblers easily and correctly handle this task. What really makes a "good" assembler, though, is a combination of its ability to edit the source listing as you enter it and the extra commands built into the assembler for the convenience of the programmer. These extra commands let you load and save source and object code, link multiple source files together, assemble object code for computers other than the Apple, and do many other things.

A major group of these extra functions are often called *pseudo-ops*, or *directives*. "Directive" is probably the more descriptive term; it tells the assembler itself to do something special during the assembly process. Unlike a mnemonic, which actually represents an instruction the 6502 microprocessor understands, you can use a directive to create a wide variety of functions within the assembly-language source listing.

For example, in **Listing 1**, the command LDA #\$C1 creates bytes \$A9 and \$C1 to tell the 6502 to load the accumulator with the value \$C1. Suppose, though, you simply wanted to create a space for some data in your program, data the program itself may use later. In this case, you can use a statement like DS 5 in the source listing to set aside 5 bytes of memory (usually filled with zeros to start) within the object code the assembler cre-

ates. The letters DS stand for Defined Storage, and are a directive for the assembler. You'll be learning about a lot of directives as this column progresses.

The Mini-Assembler

To get your first taste of using an assembler, you don't have to go out and buy one: You probably already have the "mini-assembler," so called because it provides only the bare essentials of an assembler's functions—translating mnemonics into object-code bytes. This mini-assembler is present on all DOS 3.3 System Master disks (within Integer BASIC), any II or II Plus with Integer BASIC available, and on IIc's and enhanced IIe's.

How to Install and "RUN" the Mini-Assembler

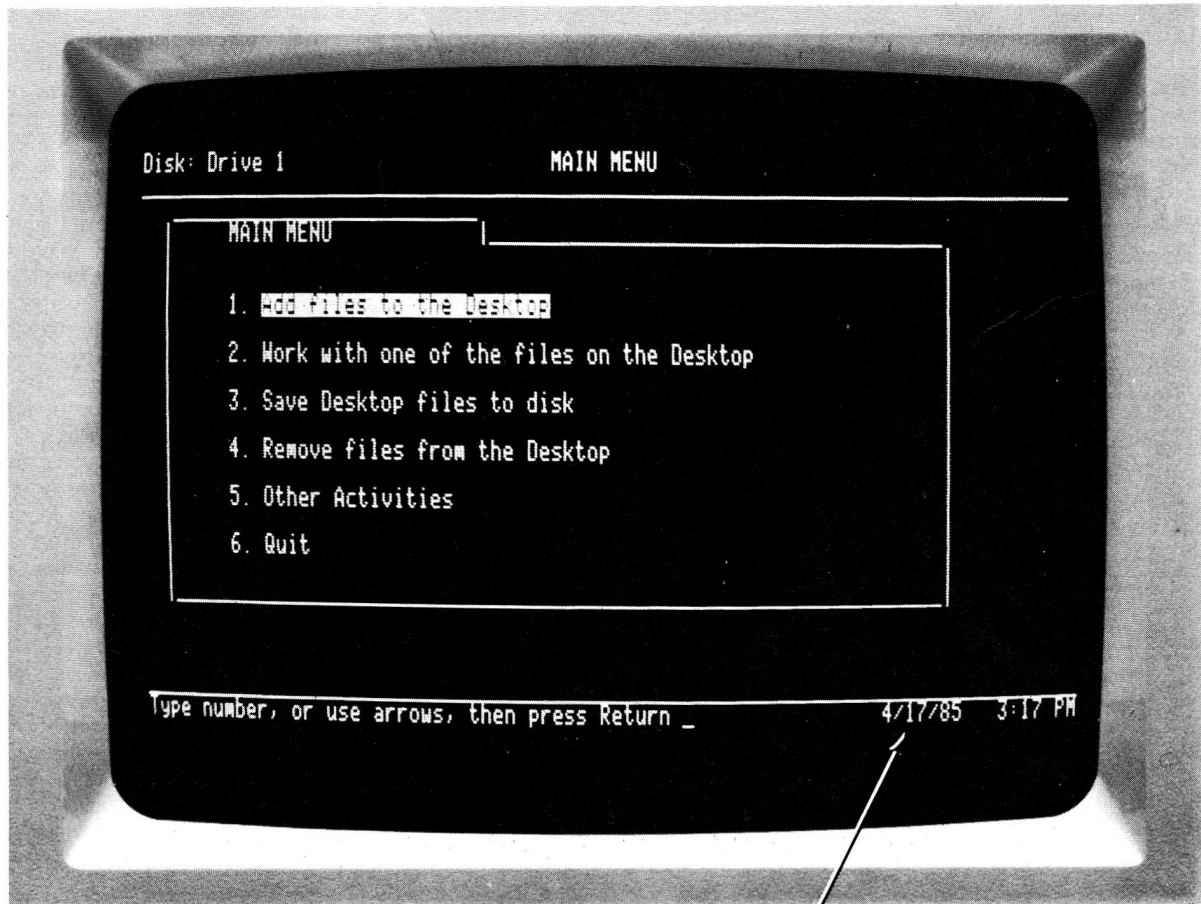
For IIc and enhanced IIe's only: If you have a IIc or enhanced IIe (65C02 microprocessor and mouse/text character set installed), you can enter the mini-assembler by first making sure you're in Applesoft's immediate mode (the] prompt will be on screen). Then type in CALL -151 to enter the Monitor. Finally, type an exclamation mark (!) and press the return key. The prompt should change to an exclamation, indicating that the mini-assembler is now active.

For all other Apple systems: You will first have to install Integer BASIC. If you don't have one of the original Apple II systems on which Integer is

Listing 1. Assembly-language program. The first column shows memory addresses; the second, object code; the third, source code.

0300-	A9 C1	LDA #\$C1
0302-	8D BC 05	STA \$05BC
0305-	60	RTS
0306-	??	
0307-	??	
0308-	??	

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In fact, you could put ALL the competitive cards in every slot in your Apple and you still wouldn't have all the features of the Timemaster H.O.

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standard, you must first boot the DOS 3.3 System Master disk to install Integer BASIC on the language card (16K RAM card). When the Applesoft prompt (the `] character`) appears on screen, type `INT` to enter Integer BASIC. The prompt will change to a greater-than sign (`>`). Then type in `CALL -151` to enter the Monitor. Finally, type `F666G` and press the return key. The prompt should change to an exclamation character (`!`), indicating that the mini-assembler is now active.

Using the Mini-Assembler

To enter a machine-language program using the mini-assembler, you must first tell the assembler where you want to start by typing the address, a colon, and the first assembly-language instruction. To create the program shown in **Listing 1**, type:

```
300: LDA #$C1
```

and press the return key. The screen reformats the text to print:

```
0300- A9 C1    LDA #$C1
```

This confirms that the information was interpreted correctly. At this point, you don't need to enter further memory locations—just the next instruction will do. To enter it, press the space bar once (this is required) and then type:

```
STA 5BC
```

and press the return key. The screen reformats to display:

```
0300- A9 C1    LDA #$C1
0302- 8D BC 05  STA $05BC
```

Notice that the dollar sign in front of an address or value is not required in the mini-assembler, and that the mini-assembler automatically puts each new instruction at the next available memory location. It assumes that all numbers used are in hex. Now type in `RTS` and press the return key.

To exit the mini-assembler, type in `$FF69G`. (On the `//c` or enhanced `//e`, pressing the return key alone will exit the mini-assembler.)

To list the program, type `300L`. The screen should display a listing similar to the one in **Listing 1**. To test the

program, return to Applesoft BASIC by typing `FP` and pressing the return key. Now type in `HOME` to clear the screen, followed by `CALL 768` to call the routine. The letter `A` should appear in the center of the screen.

Assembler Fields

When creating an assembly-language program, you should always enter the information on each line of the source listing in a certain order. The computer then puts this information in a certain position, or *field*, to indicate what type of information it is. The mini-assembler is rather limited; it allows only three fields of information.

The first field is the address field; it specifies where the next instruction bytes will be placed. Following this comes the mnemonic for the instruction, and finally an *operand*. The operand is the number value or address (if any) the instruction will use.

In the mini-assembler, you can use the address field only when you start to enter a routine at a new location in memory. Once you enter the starting address, you can skip this field on successive instructions by typing just the space character followed by the next two fields.

The instruction field usually contains a mnemonic, but in more advanced assemblers, you can also place directives here. The instruction field always has a three-character mnemonic to indicate the desired instruction. Directives usually have three characters, but this can vary by assembler and for individual directives.

Many instructions allow several types of *operands* (meaning "the object of the operation") that affect how the instruction operates. Because most instructions deal with memory addresses, these variations are usually called addressing modes.

Last month provided an example of two of the most common *addressing modes*. In **Listing 1**, the second instruction, `STA $5BC`, tells the 6502 to store the content of the accumulator in location `$5BC`. This is called the *absolute* addressing mode, because the address is exactly specified, without modification. As you'll see later, the contents of other registers within the 6502 can modify addresses.

The first instruction, `LDA #$C1`, is called the *immediate* addressing mode, because the value is "immediately" available to the 6502—it doesn't have to look to another memory location to determine what to put into the accumulator. The instruction

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Table. A few instructions and their addressing modes.

Instruction	Function	Example Addressing Modes
LDA	Load the accumulator	LDA #\$C1 (immediate) LDA \$C1 (absolute)
STA	Store the content of the accumulator somewhere	STA \$C1 (absolute) (immediate not available)
RTS	Return from the subroutine	RTS (implied only)

RTS also has an associated addressing mode. This *implied* addressing mode is associated with instructions where the addressing mode is obvious, usually because of the lack of one!

You have to learn about 50 main instructions in 6502 assembly language—just about half as many as the number of key words in Applesoft BASIC. One or more of eight different addressing modes can be associated with each of these 50 instructions. Combining instructions and addressing modes gives you a complete set of tools with which to create a powerful

program. Don't worry that you'll have to learn 50 times eight (400) commands; it's more like learning just 58.

Before proceeding with the mini-assembler, review the instructions and addressing modes you're familiar with so far, summarized in the accompanying **Table**.

The JSR Instruction

To experiment further, you'll need to learn a new instruction. I mentioned that you use RTS to return from the machine-language program. This instruction performs the same function

as a RETURN in Applesoft BASIC. As it happens, machine language has an equivalent of Applesoft's GOSUB command, as well. The mnemonic for this command is JSR, which stands for Jump to SubRoutine. You can use this instruction within any assembly-language program to call other subroutines within the program itself, or better yet, to call subroutines within the Monitor or the Applesoft BASIC machine-language routines.

In the October issue of this column (p. 68), I presented a number of machine-language routines built into Applesoft that you can call from normal Applesoft programs. A variation on this is to call the routines directly from your own assembly-language programs. As an example, **Listing 1** looks much better if you do a HOME first. Why not have the program itself clear the screen before printing the letter A on screen?

Writing a subroutine yourself to clear the screen would be quite advanced at this point, but fortunately one already exists in the Monitor. Location \$FC58 is the *entry point*, or starting address, for this routine; so, by simply adding the line JSR \$FC58 to the beginning of your program, you can make it clear the screen (40 or 80 columns!) for you.

Reactivate the mini-assembler as discussed above, and type in:

```
0300: JSR FC58
```

followed by the next three instructions in **Listing 1**, as described earlier. Remember to type a space before each new instruction and to quit the mini-assembler after entering the RTS instruction. The final listing should look like **Listing 2**.

After exiting the mini-assembler, try the routine by typing 300G, then pressing the return key. The screen should clear before printing the letter A. Believe it or not, you have just taken what is probably the most important and powerful step in writing your own programs. Using existing



Continued on p. 114

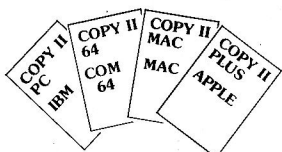
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Listing 2. Machine-language program that clears the screen before it prints the letter A.

```
0300- 20 58 FC      JSR $FC58
0302- A9 C1         LDA #$C1
0304- 8D BC 05      STA $05BC
0307- 60           RTS
0308- ??
0309- ??
```

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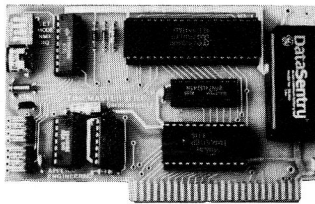
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Continued from p. 110.

routines lets you create programs with significant capabilities without your having to know how to write all the sub-routines required in their operation.

Using Built-in Subroutines

When calling a subroutine, you should consider three things. First, you should know the routine's location, usually called the *entry point*.

Second, you need to know the *entry condition*. Many routines perform a specific function, such as clearing the screen. Others vary their performance based on information passed to them when they are called. In Applesoft, you use variables to store and transfer information. In machine-language programs, it's the contents of various memory locations that are important. The entry conditions for a routine are usually defined in terms of what the routine expects to find in certain memory locations and 6502 registers such as the accumulator. You can control many routines by setting just a few of these locations or registers.

The third consideration is the *exit condition*. Many routines destroy not only the contents of the memory locations they use, but the contents of others, as well. Some routines use the exit condition to pass information *back* to the calling program. In coordinating the interaction of two or more subroutines, it is useful to know in what condition they will leave memory (the exit condition), as well as how things should start out (the entry condition).

Some Useful Subroutines

As an example of how a built-in subroutine can perform a useful task, use the routine PRBYTE (for PRint a BYTE) to create a hexadecimal conversion program. This will also illustrate how you can combine a machine-language routine with an Applesoft program to create a useful hybrid.

To create the subroutine, enter the mini-assembler as described before, and type in:

```
0300: LDA 06
```

and press the return key. Then type a space followed by:

```
JSR $FDDA
```

and press the return key and the space bar and type RTS. Then exit the mini-assembler. The screen should display **Listing 3**.

Listing 3. PRBYTE subroutine.

```
0300- A5 06      LDA $06
0302- 20 DA FD    JSR $FDDA
0305- 60          RTS
0306- ??
0307- ??
```

To save this routine (the object code) to disk, you need to know the starting address and the length of the data to be saved. In this case the routine starts at location \$300 and has a length of 6 bytes (remember to count zero). To save the object code, type in BSAVE PRINT.HEX,\$300,L\$6 and press the return key.

Next type in FP to return to Applesoft BASIC; then type in **Listing 4**. Save the Applesoft program to disk under the name PRINT.HEX.BASIC.

Listing 4. Hex conversion program.

```
0 REM HEX CONVERT PROGRAM
5 PRINT CHR$(4);"BLOAD
  PRINT.HEX,$300"
10 HOME
20 INPUT "DECIMAL NUMBER TO
  CONVERT:";N
25 IF N = 0 THEN END
30 IF N < 0 OR N > 255 THEN 10
40 POKE 6,N: REM STORE NUMBER
50 CALL 768: REM PRINT HEX
  NUMBER
60 PRINT: GOTO 20
```

When you run this program, it loads the object code from disk, asks what number you want converted, and then prints the hexadecimal equivalent of that number on the screen. Enter a value of zero to exit the program.

PRBYTE is a nifty Monitor routine that your computer uses whenever it prints hexadecimal bytes on the screen (such as when LISTing a portion of memory). The routine starts at \$FDDA (the entry point), and prints the content of the accumulator as a hexadecimal number (the entry condition). On return from the routine, the content of the accumulator will have changed (exit condition).

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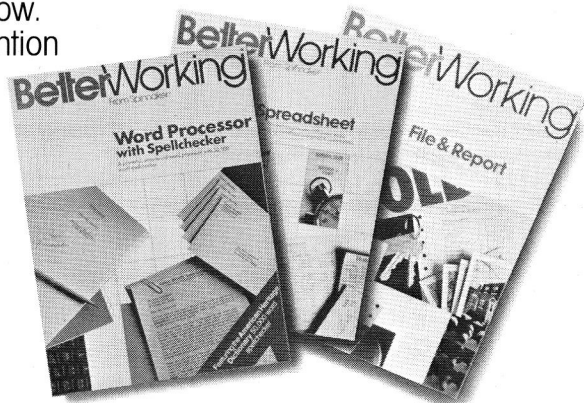
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* Comparison based on Apple® II Series versions.

Your assembly-language routine works by first going to location \$06 (set up by the Applesoft program) to get the value to put into the accumulator, at which point it calls the PRBYTE routine. Because the PRBYTE routine is limited to printing only the accumulator, you are limited to converting values between one and 255. For numbers greater than 255, you can use the Applesoft program in **Listing 5** to call the PRBYTE routine twice.

Because the PRBYTE routine does not print a RETURN after the hex number, you can print the 2 bytes side by side to form the complete hex-number equivalent. Lines 40 and 60 determine the high- and low-order bytes of the number N. If you're unfamiliar with this concept, future issues of this column will discuss that idea, as well. In the next column, I'll introduce some of the other registers of the 6502, and show you some other routines that can come in very handy.

Choosing an Assembler

In the meantime, you should probably start seriously looking into an assembler to purchase, or a public-domain assembler from your local user group. You have probably already noticed that the mini-assembler does not provide a method to save the source code for a program, and that changing a program generally means retyping the entire program. As your programs become larger and more involved, the mini-assembler will become inadequate for the job.

An assembler is to assembly-language programming as a word processor is to writing. It does not actually create the end result for you, but it does make getting there a lot easier. Likewise, many of the desirable qualities of an assembler sound a lot like those of a good word processor. It should be able to easily edit one or more lines of text in the source listing (source listings, in fact, are often saved to disk as text files!) and have global search and replace

functions, the ability to move or copy blocks of text within the listing, and most of the other features usually associated with word processors.

Other features to consider are compatibility with other assemblers, so that you can type in source listings

Listing 5. Hex conversion program that calls PRBYTE twice.

```
0 REM HEX CONVERT PROGRAM #2
5 PRINT CHR$(4);"BLOAD
  PRINT.HEX,A$300"
10 HOME
20 INPUT "DECIMAL NUMBER TO
  CONVERT:";N
25 IF N = 0 THEN END
30 IF N < 0 OR N > 65535 THEN 10
40 POKE 6,INT(N/256);REM STORE HIGH
  ORDER BYTE
50 CALL 768:REM PRINT HEX
  NUMBER
60 POKE 6,N - INT(N/256)*256:REM
  STORE LO ORDER BYTE
70 CALL 768:REM PRINT 2ND HALF OF
  NUMBER
60 PRINT:GOTO 20
```

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from other magazines and reference books; number of directives (pseudops) to make life easier; accessory utilities (some assemblers include other useful utilities); speed of assembly (most are acceptable—Apple's ED/ASM is notoriously slow); and which operating system (DOS 3.3 or ProDOS) you want to use (programs in this column will function equally well under ProDOS or DOS 3.3, although at some point I may explore ProDOS specifically). In future installments, I'll be using the Merlin assembler, but listings presented should be compatible with most major assemblers. Where differences occur, I'll provide conversion charts within the column for major assemblers.

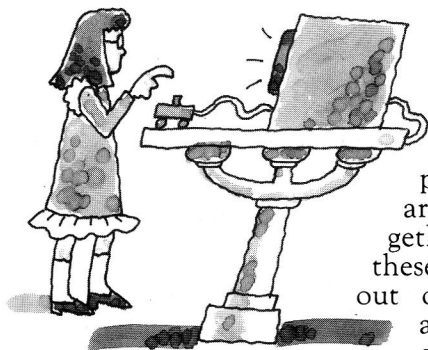
If you have the October issue of this column, you may want to experiment with calling some of the routines listed there from your own machine-language programs as an exercise in using the built-in routine. ■

Roger Wagner is the author of Assembly Line: the Book and is president of Roger Wagner Publishing, the publisher of Merlin and MerlinPro assemblers. Write to Roger at Roger Wagner Publishing, 10761 Woodside Avenue, Suite E, P.O. Box 582, Santee, CA 92071.

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CW Communications, ComputerLand and The Computer Museum invite you to send in your early personal computers, software, and memorabilia — you could win a free trip to The Computer Museum in Boston

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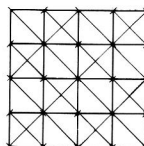


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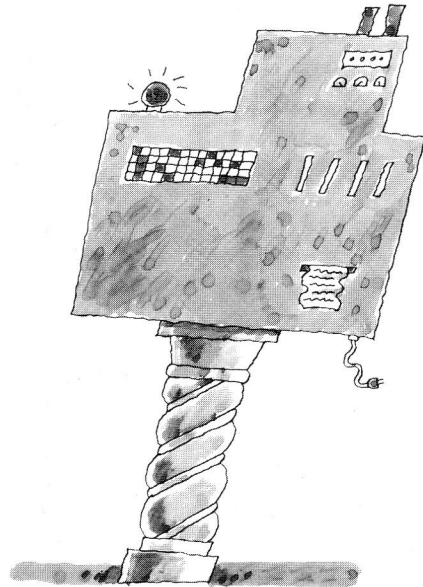
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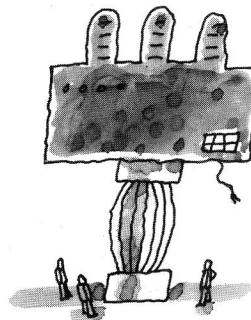
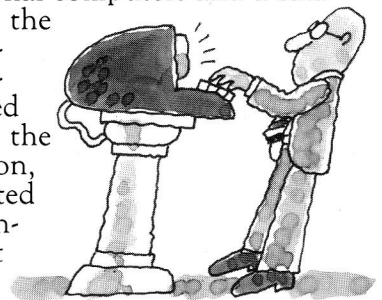
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evolution of personal computers and a catalog highlighting the Museum's collections. If your submission is accepted for addition to the Museum collection, you will be invited to the grand opening of the exhibit and will receive a bound edition of the catalog. If your item is selected as one of the five best "finds", you will also receive an all-expense-paid trip to Boston for the grand opening party.



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REVIEWS

InCider's Ratings

★★★★	Excellent
★★★	Above average
★★	Good enough
★	Not up to standards
☆	The empty set

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★★	Ease of set-up
★★	Ease of use
★★	Documentation
★★	Support
★	Overall

Unlike Apple's other recent new product releases, the UniDisk seems to reflect the company's shuffling and reshaping. A cosmetic upgrade to the aging, box-styled Disk II, the UniDisk is a half-height drive in a three-quarter-height enclosure. It complements the existing DuoDisk in content and appearance—but it's still only 143K.

Inside the traditional Apple-colored plastic box, the drive is sheathed in aluminum. I can only imagine that this is a concession to the spurious FCC emissions code. While you could crack open the old Disk II in less than a minute for a quick speed adjustment, the UniDisk requires major disassembly (a small torch wouldn't hurt)—and it's still 143K.

Despite proven Apple performance (although third-party drives are usually less expensive) and the assumed reliability and speed of Apple repairs, it's difficult to recommend single-drive systems, which are usually aimed at the junior-level purchaser who has had little prior computer experience. The UniDisk drive, though, does have a built-in 19-pin D-type connector for that time when a second drive be-

comes necessary—even though it's 143K.

With everyone poised, breath bated, waiting to take a look at Apple's totally *new* drive, the UniDisk 3.5 (a 3½-inch maxi-storage mechanism—see "Apple Announces New Products That Dazzle, New Enhancements That Perform," November 1985, p. 12, for more information), the UniDisk seems to be a let-down. It is, until you talk to the folks at Apple and hear them say, quite pointedly, that the UniDisk is meant only to round out their product line. It's *not* a major new product release. I can only hope that this *real* new drive does live up to expectations. The Apple II could certainly use it—especially if it isn't 143K. ■

Bill O'Brien

Fort Lee, NJ

Visible Pascal

Wiley Professional Software

605 Third Avenue
New York, NY 10158

Programming language

Any Apple II, 64K

(Apple II or II Plus requires language card)

\$59.95

★★★★	Ease of set-up
★★★	Ease of use
★★★★	Documentation
★★★	Support
★★★★	Overall

Compared to most other Pascal systems, Visible Pascal provides a gentle introduction to this interesting programming language—kind of like learning Pascal from Mr. Rogers instead of a Marine drill sergeant. The advantage of Visible Pascal is that it's an interpretive system—not compiled, like most versions of the language (which make you type in your program, then instruct the Pascal compiler to convert the program to machine language). Visible Pascal executes program statements one line at a time and lets you view the output and corresponding program line simultaneously, although this method decreases speed significantly.

Visible Pascal also adds a few extras to standard Pascal, mostly graphics routines, which are cute, but not too useful. It's spiffy to see the lion chasing the

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little gnome, but after a few runs it has all the appeal of an overplayed song on AM radio.

Graphics Example

In Visible Pascal the spotlight's on graphics—a questionable emphasis. Certainly, well-executed graphics add more interest than the dry examples in Pascal text books. Visible Pascal produces high-quality graphics and includes powerful graphics functions. An interpretive system, though, is too slow to create any gee-whiz scenes. You can't use an interpreted language to conduct galactic warfare.

Beyond the advantages and disadvantages of its interpretive environment, Visible Pascal includes a few neat toys: One program plays music, another draws pictures (with paddles or a joystick), and another generates designs. All these programs are entertaining, but so is Pac-Man—which is about as helpful for learning Pascal.

These extra goodies let you play with a computer without getting into trouble. That's an important consideration for novices, but experienced users will find them rather mundane.

Limitations

To produce a pleasant learning environment, the creators of Visible Pascal had to do some heavy pruning in the undergrowth of the standard language; for instance, they eliminated pointers and records. These are some of the more powerful and useful features of Pascal, but beginners rarely encounter them—and won't miss them.

Unlike the standard edition of the language, Visible Pascal doesn't require semicolons. Although its authors contend that the semicolon is a beast that surprises and frustrates novice and experienced Pascal programmers alike, there is no justification for its removal. In an interpretive environment, it's easy to see errant semicolons and the trouble they cause. Also, once you graduate from Visible Pascal and work with the true language, the semicolon (now in cahoots with an equally merciless compiler) will destroy many programs. It seems best that newcomers know about the semicolon while learning the syntax of the language.

Should You Buy?

Easy-to-use software and documentation make Visible Pascal excellent for learning Pascal and structured programming. It's also fun. If you're a new programmer looking for a system that takes you by the hand (and sometimes the throat) through the Pascal jungle, buy it. But if you're an experienced programmer, you may want to put your 60 bucks toward a regular Pascal system. Either way, you must eventually acquire a real version of Pascal—one with a compiler—to program in the language. ■

James McKelvey
London, England

Kyan Pascal

Kyan Software

Department H
1850 Union Street #183
San Francisco, CA 94123

Programming language
Any Apple II, 64K
\$69.95

★ ★	Ease of set-up
★	Ease of use
★	Documentation
★ ★	Support
★	Overall

With increasing interest in Pascal, the once-ubiquitous Apple Pascal now finds itself pitted against several system contenders in the marketplace. Among them is Kyan Pascal, which generates actual machine language, so you can run a compiled version of your program, unlike Apple Pascal programs, without a system disk. Although the Kyan compiler is a bit faster than Apple Pascal's, Kyan isn't significantly speedier—it's a two-pass system, and its slowness is its biggest drawback.

In this two-pass method, the first pass translates the Pascal program into assembly language, and the second translates that version into machine language. Every time you compile a program, you must wait for both the compiler and the assembler to finish. The dubious advantage of such a system is that it lets you examine and modify the assembly language before its final translation. Theoretically, you can then write efficient assembly-language subroutines for your most important programs, but there are problems with this technique. Hacking through a Pascal program to save only a few milliseconds is like putting mag wheels and a turbocharger on a Rolls Royce—it's inappropriate and dangerous.

The biggest problems with Kyan Pascal become apparent after you've used it for a while. The product just isn't intelligently designed. You get the impression that three people were sitting around a bar one night and one of them said, "Hey, Moe, wanna build a Pascal compiler?" The compiler chokes and dies if you include a null statement (a statement that conveys no information). The editor is clumsy and poorly adapted to writing programs. There are no debugging tools and no overlaying facilities (a memory-saving necessity on small computers). There are precious-few predefined functions. Error messages are confusing, incomplete, sparse, and terse. Also, the compiler sometimes fails for no reason.

Documentation

The documentation is nothing to alert the Pulitzer Prize committee about. The manual is disappointing from the moment you open the book (and the errata sheets fall out) to the time you finally locate the in-

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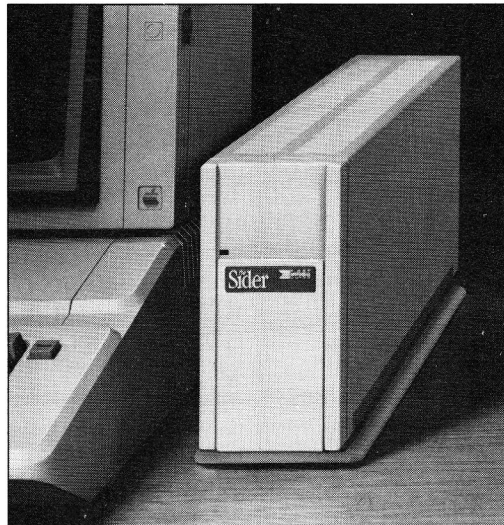
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formation—which is often garbled by typographical errors. The manual provides a fairly good introduction to the workings of the system, but that's it. As an introduction to Pascal, the text is incomplete and too complicated for the novice. As a reference manual, it's inconvenient: The lack of a comprehensive index—or even any logical progression of chapters—is infuriating.

Quite frankly, the system isn't worth Kyan's \$70 asking price. For a system claiming to be "lightning-fast and loaded with features," it's at best moderately quick and very sparse. Kyan Pascal is the beginning of a good system, but it needs major revisions before it can compete with the more professional implementations of the language on the market. ■

James McKelvey
London, England

Editor's note: Thomas Eckman of Kyan Software responds that Kyan Pascal is a "one-pass compiler coupled with a two-pass assembler. While it may compile a little more slowly, Kyan Pascal gives programmers the capability of building libraries of linkable assembly-language routines and 6502 machine code that run much faster than other Pascal implementations. The editor is modeled after WordStar and is only as clumsy as that popular product. And, using the Chain function, programmers can overlay programs and pass parameters between them." He challenges skeptics to take advantage of Kyan's money-back guarantee, and suggests they read Tom Swan's Pascal Primer in the October 1985 inCider (p. 52) for a second opinion.

V-Color Graphics Tool Kit 1.0

Video-7

550 Sycamore Drive
Milpitas, CA 95035

Graphics utilities

Apple IIc, or IIe with 128K

\$49.95

- ★ ★ ★ ★ Ease of set-up
- ★ ★ ★ ★ Ease of use
- ★ ★ Documentation
- ★ ★ Support
- ★ ★ ★ ★ Overall

Just as a well-stocked tool kit makes a mechanic's life easier, the V-Color Graphics Tool Kit 1.0 makes double-hi-res work less odious—and somewhat more enjoyable—for a programmer, thanks to a series of ampersand-prefaced commands. The tool kit is a collection of Applesoft routines combined with a special graphics driver. Some sour notes spoil this otherwise-fun package: If you don't have an Apple IIc, you need a IIe with 128K of memory.

The software routines are supplied on a double-sided disk—DOS on one side, ProDOS on the other.

After loading the hi-res driver, you can set any of six graphics modes (but only five are currently implemented). Commands & GR 1 through & GR 6 establish monochrome double hi-res with 560-by-192-dot resolution; 16-color double hi-res in 140-by-192; a combination of modes 1 and 2 on the screen; mode 4, the hold-out; black-and-white hi-res at 280-by-192; and a medium-res, 16-color mode with 80-by-48 resolution. The 16 colors range from black to white with no duplications among the magentas, blues, yellows, greens, and intermediate tints.

The Picasso in You

The tool kit lets you move the graphics cursor to draw lines, fill areas, and add text to the screen. And if you're not happy with Apple's character set, V-Color includes a character editor—but it's for ProDOS users only. When you're done, a resequencer lets you "replay" everything you've drawn.

Actually, the sequencing feature is part of Key.Draw, an Applesoft program that combines the tool kit's graphics utilities into a usable, viewable form. Its companion, Mouse.Draw, a mouse-driven version of the same program, is also written in Applesoft. Neither is a professional implementation of V-Color's graphics resources, and Video-7 doesn't pretend they are. Rather, Video-7 suggests using the two programs as examples of how to program with the graphics extensions they illustrate.

The Shape of Things to Come

If you've ever tried to use shape tables, you've experienced the nadir of Apple work. You'll be relieved to find a shape generator on the tool-kit disk. The generator makes composing shape tables as easy as using the open-apple and arrow keys.

Beware, though: The hi-res driver loads partially into the extended-memory area and partially into the Apple's normal memory. Video-7 recommends that you upgrade the tool kit with its V-Color Apple IIe RGB interface (80-column output, RGB and extended memory), which is the equivalent of Apple's Extended 80-Column Color Card. I did notice the usual increase in color depth with an RGB card and monitor, but the tool-kit routines produced such superb output with just the Apple's standard composite video into a corresponding color monitor that you might consider RGB overkill.

In either case, your Apple IIe must be capable of double hi-res (REV.B or higher motherboard). If you're assured of that, most RGB interfaces using AUX CON will automatically place the computer in double hi-res. If you're using Apple's 80-column extended memory card, just add the enclosed jumper at J1 on the card.

Since the V-Color commands require the ampersand prefix, if you run any other programming addons that use the same lead-in character while V-Col-

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or's hi-res driver is loaded can produce odd results.

Although the tool-kit manual is accurate (though it tends to slaughter the English language in spots), Video-7 seems to have designed the documentation for a younger audience. My nearly middle-aged eyes almost needed their own video enhancer to read the tiny type size.

Although this isn't some ultra-powerful, incredibly chic graphics package, if you're trying double hi-res, the V-Color Tool Kit is a good value at \$49.95. If you're trying to design better graphics routines, the kit is an even better bargain: For the paltry sum of \$20, Video-7 will send you the source code for its double-hi-res drivers in both DOS and ProDOS formats. ■

Bill O'Brien
Fort Lee, NJ



Remember!

DesignWare
185 Berry Street
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Memory training
Any Apple II, 64K
\$79.95

- ★ ★ Ease of set-up
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- ★ Overall

Imagine a publisher claiming that its memory-training software "is so powerful it's worth buying a home computer just to use the program." Whether you're a veteran or a recent convert, Remember!'s packaging is sure to send a thrill of excitement down your spine—especially if you need a little help in the memory department. Remember! does not live up to its promise, though. The program's not dead in the water—it won't crash on you—and it does offer some "cute" features. Unfortunately, the developers, programmers, and marketing people have overlooked some of the fundamentals.

Remember! is a low-level filing system married to a run-of-the-mill test generator. You design 20 question-and-answer lessons around facts you need to learn, then save the lessons on data disks, which you initialize from within the program. You can put several lessons on one disk or keep a separate disk for each subject on which you're working. You can then study the material via electronic flashcards or by quizzing yourself. The program can present questions in sequential or random order, with a choice of question-to-answer, answer-to-question, list, or multiple-choice format.

One of Remember!'s unique (though overrated) features is its Hints option. Once you set up your lesson, you can add visual, auditory, or written hints

to help you learn. The visual aids are crude line drawings you construct with selected keys or a joystick. The audio hints are little tunes (a maximum of 20 notes within one octave or so) you compose to jog your memory. These reminders may be little more than distracting time bandits—and if you're in school, your teacher won't like it if you hum during a test. Written prompts may be up to 34 characters long. You may not mix hints in any given lesson, even though a melody may work best for remembering one fact and a picture for another.

Remember! can also show foreign-language accent marks and subscripts (handy for chemistry) on screen. (When you set up a lesson, you choose the language in which you want to work—English, German, Spanish, Italian, or French.) You must access subscripts and accents through the number row on your Apple. If you try to use these keys as ordinary numbers, though, you'll find you can't.

Being able to see these additional characters on screen is a welcome feature. But when you print lessons to take with you for later study, the hard copy will not include the accents or subscripts—even if your printer can generate them. Seeing "H₂O" probably won't hamper your efforts at learning chemistry, but seeing "le frere" in print will definitely slow your attempts to master the intricacies of a language.

Remember! has other design problems, as well. For example, you must type your answers exactly as you entered them originally—that means typing zinc for Zinc will produce a beep, and the program will deduct a point from your score.

As for documentation, the "Learning How You Learn" section in the user's guide is a somewhat pedantic outline of historical and contemporary methods of memorizing facts. My impression of this insert

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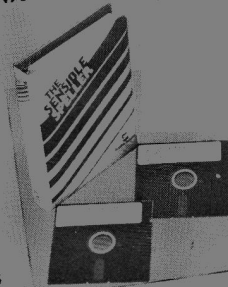
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is that its only function is to boost the publisher's claims about this "revolutionary learning program"—and that a majority of the program's users will probably just gloss it over.

My wish-list for Remember! includes an option for typing in alternate answers to questions. In some lessons, such as learning the state capitals, there can be only one correct answer. But it's unfair—even educationally wrong—to penalize a student if memory tells him or her that HCl is hydrochloric acid (an acceptable alternative), when the only answer the program "knows" is hydrogen chloride. Without more flexibility, I cannot agree that Remember! "teaches you how to learn." Instead, it teaches you to think like a machine.

The program's speed didn't impress me, either. Written in MicroMotion FORTH-79, Remember! is supposed to be fast. Its response time was sluggish, though, and some delays made me wonder if the program had gone to recess.

On the positive side, Remember! is easy to learn and use. The text style on the monitor is pleasant, and the "pointing finger" cursor is a nice change from the boxes you usually chase around the screen.

Remember! might encourage you to organize information you need to learn, yet I have many reservations. In my judgment, the program is not suitable for "an infinitely wide range of subjects," as DesignWare claims.

Finally, I wonder if an already motivated student needs an \$80 electronic flashcard set to help him or her master a subject—and if an unmotivated or slow learner can really benefit from a software package that only rates a grade of D. ■

Cynthia E. Field
Wakefield, RI

Sally Bowman at DesignWare responds, "Remember! does help students improve their ability to remember, but it is not a memory-training program. It is a tool to help students organize and study the vast amounts of information they are all required to memorize—new terms, new definitions, dates, people, places, events, etc. Before students are able to move on to problem solving and understanding, they must memorize the terminology. Remember! allows them to do so easily."

"The hint editors were not intended to be complex—they help jog your memory, not belabor the drawing process. Many students, during the field testing, found that the process of developing a hint made them remember the new information."

"The reviewer does not like programs that help students memorize ('teaches you to think like a machine'). Students still have to memorize vast amounts of information."

Peterson's Financial Aid Service and Peterson's College Selection Service for *Selective Guide to Colleges*

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- ★ ★ ★ ★ Documentation
- ★ ★ Support
- ★ ★ ★ ★ Overall

Parents and high-school counselors will appreciate these two software/reference-guide packages which help students find their way through the ins and outs of college selection and financing. Both perform their job well and contain elements of interaction and fun that written materials alone can't provide. The two packages are complementary, but separate; you can use one without the other.

The Selection Service

The College Selection package consists of two copyable disks and two books: the *Selective Guide to Colleges* including vital statistics for 275 colleges; and the *Counselor/Student Manual*, which provides helpful detail in using the software and guide.

The program is logical and easy to use. It leads you step-by-step through 18 selection criteria, including an extensive list of majors, costs, admission requirements, and special programs. The goal is to eliminate colleges and end up with a reasonable number to evaluate using the additional information in the guide.

For each criterion, pick one or more choices listed on screen. At each step, the program shows the number of schools remaining in your pool. If your choice reduces the pool too much or not enough, you can back up, change your answer, and see the new result.

Whenever you have 40 or fewer choices, you can list them, along with their page numbers in the guide. You can also get a complete summary of the selections leading to those choices, so you can review your choices and change any you like.

The Financial Aid Service

The Financial Aid Service contains three disks (two are double-sided) you can back up; the *College Money Handbook*, which is described as "the complete guide to expenses, scholarships, loans, jobs, and special aid programs at four-year colleges"; and the *Counselor/Student Manual*, which explains the use of the software and handbook.

The package provides a good starting point to explore financing college, but success probably depends more on a good counselor than on the package itself, as finance is rather complex.

The package covers five topics: estimating family contribution; calculating costs and estimating need; average costs by type of college; federal- and state-aid programs; financial aid from private sources.

The information you provide lays a factual base for exploring financial aid opportunities. A printed report lists aid programs that match your interests.

Most of the manual is filled with descriptions of state-aid programs and includes addresses for requesting further information. The handbook, on the other hand, includes college-cost and aid profiles that list expenses, summarize various kinds of financial aid, list money-saving options, and give information about applying for aid. Together, the program, manual, and handbook form a helpful package.

Conclusion

The College Selection software is thorough. Virtually everything you need is displayed on screen or is accessible with only a few keystrokes.

The Financial Aid Service program is not as interactive as the College Selection program. It lacks the give and take, the sense of adventure and speculation that make the selection program especially fun. But neither is it grim—Financial Aid Service makes the best of a pragmatic and mundane subject. ■

Jon Voskuil
Milford, NH

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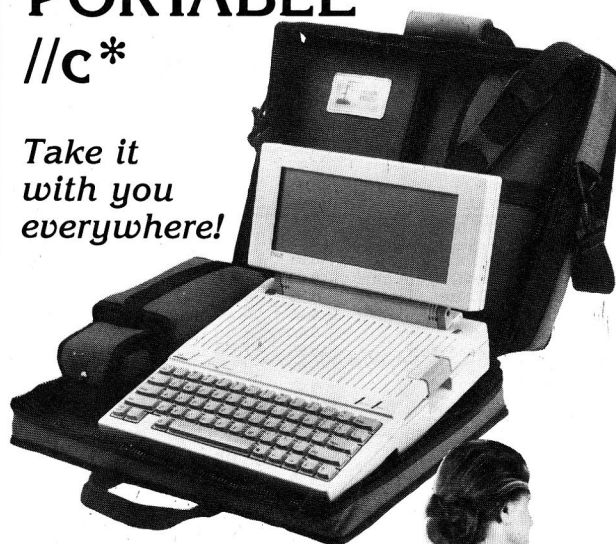
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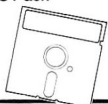
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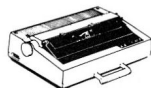
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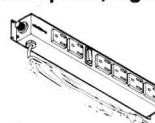
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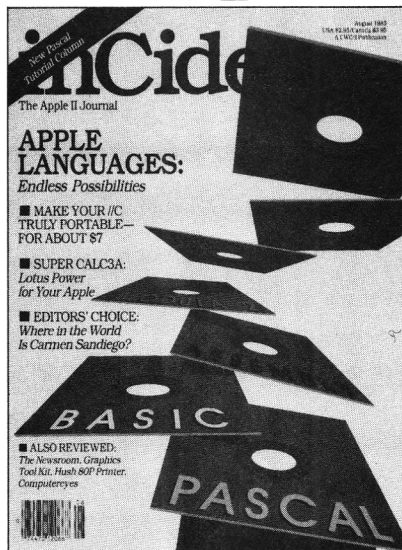
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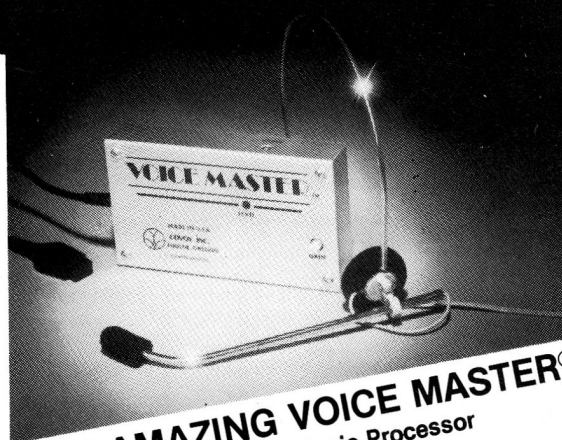
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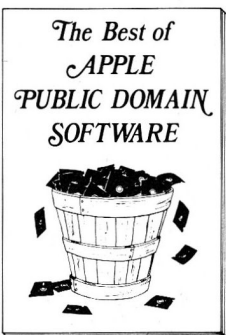
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REVIEWS

Stockpak II is not cheap, though. Once the initial, "free" six-month subscription is exhausted, you must renew your subscription yearly to a data base—the Composite Database, the NYSE (1500 companies), the AmSE (800 companies), or the OTC Stock Exchange data base (2300 companies).

Keep in mind that financial data bases you access by modem can be prohibitively expensive in terms of subscription cost, hourly connect-time rate, and pound of flesh extracted by the telephone company. But, print media—even the venerable *Wall Street Journal*—cannot compete with this software's versatile screening and reporting capabilities.

Because of the market's volatility, however, Stockpak II should not be your only investment tool. When coupled with current news reports and timely quotes from other sources, Standard & Poor's new software can help you effectively exercise your own investment philosophy. ■

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You are about to enter a new dimension in personal computing—the Digital Dimension, an area that familiarizes you with the inner workings of your computer. With your companion, Willy Byte, you make your way through this game on a quest for computer knowledge. Unfortunately, the difficulty of playing Willy Byte diminishes the program's learning potential. At times, it's so frustrating that you want to quit and remain blissfully ignorant.

The color graphics, though, are outstanding. And with an Apple IIe, Mockingboard sound card, and A-Max audio, we enjoyed the voice and high-quality music featured in this program. (You can use the program without these peripherals, but you won't hear Willy's comments.)

Your mission is to build a message and successfully send it through the proper computer components. You maneuver Willy on and off the many buttons in the on-screen central processing unit (such as the keyboard, RAM, and disk drive) that comprise the options menu. You can go to one place, complete your task, and return to the CPU to choose another. Or,

you can plan a flowchart to program your game play and visit all the components needed for getting your message through the Digital Dimension.

And the Message Is...

For example, you might construct a flowchart for a simple one-character message, such as the letter A: KEYBOARD> RAM> IF-THEN> DISK. You start at the keyboard, then go to RAM. Once Willy presses the power button in the keyboard room, the first character of the message appears at the top left of the screen, and its hexadecimal equivalent at the top right. Willy, an animated character with a head that looks like a helmet, must push eight balls down long poles representing the 8 bits in one character, or byte. Static balls that punch gaps in the poles thwart his mission, however.

If your message carries an error, the flowchart will take you to the trouble spot where you can correct it. Eventually, you'll get your message to the Disk Drive. At game's end, the program gives you an efficiency rating and a chance to enter your name in the Top Eight List of Willy Byte-ers.

Willy keeps your interest up throughout the game as he talks, grumbles, and cheers you on in his gravelly, digitized tone. "Oh, wow" and "all right" are his favorite exclamations.

Although the flowcharting game play isn't thrilling, the visual display showing the relationship between ASCII (American Standard Code for Information Interchange) characters and their hexadecimal- and binary-byte counterparts is effective.

Once you move your byte safely to the bottom of the keyboard screen, it's whisked away from view. You then maneuver Willy to the RAM screen, where he must tug the bytes out of a tunnel and put them into certain slots. Here, adversary Hex Luthor attempts to foil Willy's work by exposing the bytes to extreme heat, water, and loss of power—common environmental hazards to your computer. The graphics in this section help get the warning across. The program, though, contains just too many obstacles—you must be highly motivated to continue your struggle to Disk Drive.

Three additional screens complete Willy Byte: the Power, the Clock, and the Map. The Power is graphically very interesting—it's a vivid red even on a television hook-up. As a game feature, the Clock brings attention to this often-neglected computer component. The Map screen displays all the machine's components together while remarkably complex computer music plays in the background.

Willy Byte creatively uses design, color, voice, and music with a great deal of skill. The learning concept behind Willy Byte is laudable; if the quality and ease of game play were nearer the level of Lode Runner, for example, it would deserve rave reviews. ■

Anita Malnig
Steven Kaufman
San Francisco, CA

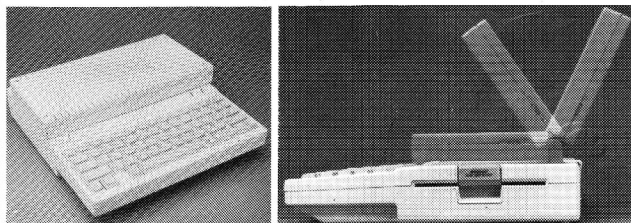
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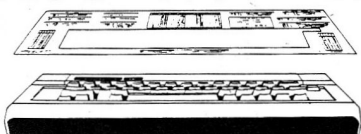
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REVIEWS

Think Fast

Brainpower

24009 Ventura Boulevard
Calabasas, CA 91302

Memory training
\$39.95

- ★ ★ Ease of set-up
- ★ ★ Ease of use
- ★ ★ Documentation
- ★ ★ Support
- ★ Overall

Can you improve your memory by answering series after series of increasingly difficult questions? Think Fast claims you can, and the tests are fun at first—but taking them really doesn't teach you anything.

Questions supposedly address alternate sides of your brain. You begin each test by choosing speed (fast, medium, or slow), level of difficulty (the number of questions you must answer correctly to move to the next test), and risk level (how many points your correct and incorrect answers will be worth). You then tell the program the number of questions you want each test to include and whether you want to begin with a right-brain or a left-brain question.

Right-brain questions consist of small squares filled in with smaller rectangles or triangles; left-brain questions involve letters and numbers. There are only three types of questions—*compare*, *recall*, and *copy*—and the program uses two of them for both right- and left-brain tests. The discussion in the manual of the left and right halves of the brain is simplistic and misleading, and the test questions seem to blur even the few distinctions the manual makes.

Comparison questions address both halves of the brain. This type shows you two sets of letters, numbers, or filled-in squares, and you decide if they're the same or different. Two boxes with the words "Same" and "Different" are at the bottom of the screen. If the correct answer is highlighted, press the space bar to enter it. If the wrong answer is highlighted, use the right or left arrow key to highlight the correct answer, then press the space bar. "Same" is above "Different" on the screen, but you use the left and right arrows to move between them—an unnecessarily confusing procedure.

Copy questions (for the right brain only) show you squares partially filled in with smaller triangles and rectangles. The filled-in squares appear on the left side of the screen and the empty squares on the right. Along the bottom are eight different filled-in squares; a box surrounds one of them. You fill in the blank squares by moving this box with the arrow keys. When you reach a square you want to copy, press the return key and an empty square is filled in. Using the return key to enter some correct answers and the space bar to enter others is inconsistent, and the directions for the copy questions are cumbersome.

Recall questions (for the left and right brain) ask you to memorize filled-in squares, letters, or numbers. The program displays them on screen so that you can concentrate on them. When they disappear, you type in the letters or numbers, or select the correct squares as you did with the copy questions.

At advanced levels, "overlay-trial" questions interrupt the other three types of questions. According to the manual, "overlays are easily recognizable if you are using a color monitor, since the screen background changes from blue to red." I used Think Fast on an RGB color monitor—the color was terrible, and the letters and numbers were almost impossible to read. And, on a monochrome monitor, the text was difficult to read because of the program's patterned background. The documentation says nothing about recognizing overlay trials on a monochrome monitor—and for good reason—they're difficult to distinguish from the questions.

When you've answered all the questions, you get a summary report that includes your total score (based on speed, difficulty, and risk level), left-brain score, right-brain score, number of questions attempted, and number of questions answered correctly. These reports show only your scores—they don't repeat or discuss actual questions. Viewing the questions you missed and having a chance to redo them before going on might make Think Fast more valuable as a teaching tool.

After you read the summary report, the program asks you if you want to print it, and takes you automatically to the reports menu, where you choose among various report options. One of the big problems with Think Fast is that if you simply want to take another test, you can't. You have to go through the report options—a process that takes at least a minute—before you can even return to the main menu.

If you want to continue from your last test, getting back to it can take even longer, because the program stores all the tests chronologically. For example, if your last test was number 37, you have to scroll through the first 36 tests to reach it—you can't simply type in your last test name or number.

Think Fast certainly exercises your memory, but I'm not sure it improves it. I spent several hours with it, as did one of my students. Although our scores rose as we became more familiar with the system (the manual's directions for entering correct answers were confusing), Think Fast did not enhance our memories. Using the system for several weeks or months might have some effect on yours, but when you consider how frustrating Think Fast is, you won't want to take the time to find out. ■

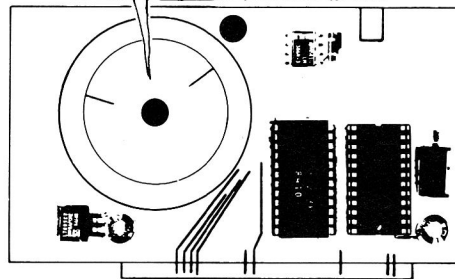
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Until Votalker IB and AP, synthetic speech systems for personal computers were like a piano with 50 keys, an eagle with a broken wing, and a singer with a two-octave range. When Votrax developed the SCO2 speech synthesis chip, it was the classic case of advanced technology in need of support systems to unlock its dormant powers. Now, Votalker introduces a revolutionary family of text-to-speech translators — the key to the lock. First members of the family are the Votalker IB for IBM PC and XT and the Votalker AP for Apple II, Apple IIe, and Apple Plus. With Votalker these units play the piano with all 88 keys. Soar through unlimited vocabulary, using 32 inflections and 4,100 pitch settings. Sing in five octaves, and generate sound effects in 16 amplitudes.

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Other Votrax Products — the stand-alone Personal Speech System and Type 'N Talk — are currently used in thousands of applications.

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A reprise of the reviews that have appeared in inCider in the last four months. Prices subject to change without notice.

★★★★ Excellent
★★★ Above average
★★ Good
★ Not up to standards
☆ The empty set

Hardware

Cari Portable Powered Work Station

★★★★
Discwasher
1407 North Providence Road
P.O. Box 6021
Columbia, MO 65205
Portable power supply and attractive carrying case for the //c, October '85
\$249.95

Centronics GLP

★★
Centronics Data Computer
1 Wall Street
Hudson, NJ 03051
Low-cost dot-matrix printer,
September '85
\$299

ComputerEyes

★★★
Digital Vision
14 Oak Street, Suite 2
Needham, MA 02192
Slow video acquisition system, August '85
\$129.95

Graphics Tool Kit

★★★
Demco Electronics
10516 Grevillea Avenue
Inglewood, CA 90304
Professional graphics expansion card and software, August '85
\$595

Hush 80P

★★★
Ergo Systems
26254 Eden Landing Road
Hayward, CA 94545
Dot-matrix thermal printer, August '85
\$159.99

Juki Model 6000

★★★
Juki Office Machines
23844 Hawthorne Boulevard, Suite 101
Torrance, CA 90503
Slow, inexpensive letter-quality printer,
October '85
\$300

Juki 6300

★★★
Juki Office Machines
(See previous address reference)
Letter-quality daisy-wheel printer, sturdy,
quiet, and fast, November '85
\$995

MW-100 C-Print Interface

★★★★
Micro-W Distributing
1342B Route 23
Butler, NJ 07405
Parallel-printer interface for the //c,
October '85
\$99.95

Serial-to-Parallel Adaptor

★★★
Discwasher
(See previous address reference)
Parallel-printer adaptor for the //c,
September '85
\$129.95

Slot Buster

★★★
RC Systems
121 West Winesap Road
Bothell, WA 98012
Gravelly text-to-speech synthesizer,
September '85
\$229.95

Software

Better Working Series: Spreadsheet and File & Report

★
Spinnaker Software
One Kendall Square
Cambridge, MA 02139
Illogical spreadsheet and senile data base with awkward integration. September '85
\$59.95 each

B/Graph

★★★
Batteries Included
30 Mural Street
Richmond Hill, Ontario
Canada L4B 1B5
Primitive presentation graphics and simple statistics, November '85
\$39.95

Creative Calc, Creative Writer, and Creative Filer

★★★
Creative Software
230 East Caribbean Drive
Sunnyvale, CA 94089
Slightly "integrated" spreadsheet, word processor, and data base, August '85
\$49.95 each

Keyboarding Alpha-Pac

★★★★
Southwestern Publishing
Consumer Products Division
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Typing teacher that works with graphics,
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★★★★
CBS Software
One Fawcett Place
Greenwich, CT 06836
Driver education for novice or experienced motorists, September '85
\$79.95

MerlinPro and Wizard's Database, and Chart 'n Graph Toolboxes

★★★★
Roger Wagner Publishing
10761 Woodside Avenue
Santee, CA 92071
Assembler that accelerates Applesoft; tools for specific applications,
November '85
\$99.95 (MerlinPro), \$39.95 each toolbox

Mr. Pixel's Cartoon Kit and Programming Paint Set

★★★
Mindscape
3444 Dundee Road
Northbrook, IL 60062
Introduction to programming through graphics for children, August '85
\$34.95

Mouse Calc

★★★★
International Solutions
910 West Maude Avenue
Sunnyvale, CA 94086
Spreadsheet and graphics with Parisian panache and 128K, October '85
\$149

The Newsgroom

★★★
Springboard Software
7807 Creekridge Circle
Minneapolis, MN 55435
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\$139 each (Writer, Calc, Filer)
\$109 (Link)

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★★★
Mindplay
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Stoneham, MA 02180
Graphics and storytelling for the wee ones, with mouse, joystick, or graphics tablet,
September '85
\$39.99

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★★★
Interactive Arts
2715 Porter Street
Soquel, CA 95073
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\$69.95

Rainbow Painter

★★★
Springboard Software
(See previous address reference)
Graphics for all ages, with keyboard or mouse, September '85
\$34.95

Story Maker

★★★
Sierra
P.O. Box 485
Coarsegold, CA 93614
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\$34.95

WillWriter

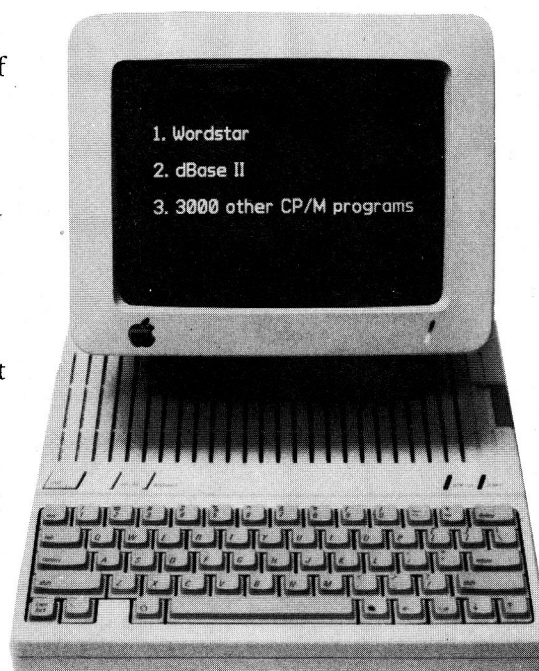
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Nolo Press
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Berkeley, CA 94710
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CP/M for the APPLE IIc

Apple IIc owners can now run the single largest body of software in existence. Enter the CP/M world with the new Z-80c from Applied Engineering and introduce your IIc to thousands of new programs. With the Z-80c, you'll be able to run Wordstar, dBase II, Turbo Pascal and thousands of other programs that require CP/M. But your IIc will still be your IIc because the Z-80c only turns on when using a CP/M disk. The Z-80c comes standard with the new 4.0 software, the most advanced system for running CP/M programs ever. But it also runs other versions of CP/M including the popular 2.2 and 2.23 and is fully compatible with Microsoft disks with no pre-boot.

But naturally you'd expect top performance from the Z-80c. After all, it's from Applied Engineering and we've got years of experience with Z-80 cards for the II+ and IIe.

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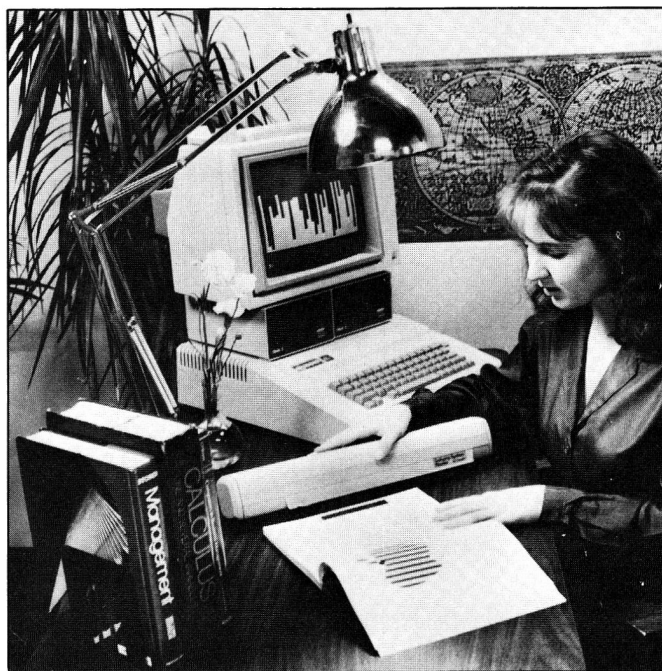
NEW PRODUCTS

edited by Paul Statt

Soft Touch

The **Cauzin Softstrip System** is an encoding and reading technology that prints software listings—data, programs, graphics, sound, and so on—in bar-code form on any paper in highly condensed form, and reads them, without error, into your Apple II. Softstrip data strips are printed graphics patterns, typically 9½ by 5/8 inches, that represent code for 5500 bytes of information. The Softstrip Reader connects to your Apple through its RS-232 port; its on-board microprocessor typically reads a strip into RAM in less than 30 milliseconds. Cauzin will license major software authors and publishers to write Stripware next year. The Softstrip Reader sells for \$199, from Cauzin Systems, 835 South Main Street, Waterbury, CT 06706, (203) 573-0150. For more information circle number 356 on the Reader Service card.

Product descriptions contained in this section are based on information supplied to us by the respective manufacturers. These announcements are provided solely as a service to our readers and do not constitute endorsement by iCider of any given product.



The Cauzin Softstrip System: bar-code printing and reading technology for Apple II's.

CP/M Source

The Apple CP/M Book covers the fundamentals as well as the finer points of CP/M operations, including the major utilities—STAT, PIP, ED, SUBMIT, and DDT—the Basic Disk Operating System (BDOS) and its routines, and more. *The Apple CP/M Book* is designed for Apple II, II Plus, and IIe users, covering all four versions of Microsoft's Basic Input Output System (BIOS) and suggestions for debugging. The 144-page volume retails for \$12.95 from Scott, Foresman and Company, 1900 East Lake Avenue, Glenview, IL 60025, (312) 729-3000. For more information circle number 362 on the Reader Service card.

Road Test

Response Time checks your reaction and response time, and by extension, your level of intoxication. The simple keyboard program tests and records your reactions to a random beep signal. Ten rapid tests combine to give you a score that you can measure against a friend's, a highway patrolman's, or your personal best. Test fatigue, disability, and dependability as well as drunkenness. *Response Time* costs \$39 from Andent, 1000 Ninth Avenue, Waukegan, IL 60085, (312) 223-5077. For more information circle number 364 on the Reader Service card.

Fast Talking

The **Apple-Mate 1200 Modem** has resident communications firmware that runs on your II Plus or IIe right out of the box. The Apple-Mate also supports commercial communications software through the resident Hayes AT Command Structure. The Apple-Mate 1200 dials automatically, answers automatically, adapts to speeds automatically, adapts to parity automatically, and more—all you do is type. The Apple-Mate 1200 sells for \$299, from Cermetek Microelectronics, 1308 Borregas Avenue, P.O. Box 3565, Sunnyvale, CA 94088, (408) 752-5000. For more information circle number 359 on the Reader Service card.

Apple with Everything

The Works! collects all the applications software your home needs into one valuable package. On a single side of a single disk you'll find 13 integrated modules, such as a graphics painter, typing tutor, letter writer, calculator, music maker, family-finance planner, and five more. *The Works!* will prove the worth of your domestic computer, for \$49.95, from First Star Software, 18 East 41st Street, New York, NY 10017, (212) 532-4666. For more information circle number 361 on the Reader Service card.

It Figures

The **Electronic Figure Book** makes a permanent record of your calculations and notes—it works on the computer as your old-fashioned figure book did in your hand. You choose between a text mode, in which you type in words, and a compute mode for calculations and computer programs. Everything you see on the monitor is saved. The Electronic Figure Book is an aid to engineers, teachers, and administrators who like to keep a record of their calculations with descriptive notes. It is available from Butterfly Computer Products, P.O. Box 525, Murrysville, PA 15668. For more information circle number 358 on the Reader Service card.

Color Me

ColorMe gives children the creative freedom to design their own pictures on the Apple screen, then print them out. ColorMe picture disks with Rainbow Brite, Shirt Tales, Hugga Bunch, and Tink! Tonk! characters are available. Children can print their favorite characters into coloring books, or onto the buttons and stickers in the ColorMe Supply Box. ColorMe is for children aged 4 and older, and sells for \$29.95. Picture disks and Supply Box are \$9.95 each, from Mindscape, 3444 Dundee Road, Northbrook, IL 60062, (312) 480-7667. For more information circle number 351 on the Reader Service card.



PFS:Plan helps you quickly create budgets, forecasts, and analyses.

Make a New Plan

PFS:Plan is an electronic spreadsheet that, like its siblings Graph, Write, and Chart, is easy to learn and use. Businesspeople and professionals can quickly create budgets, forecasts, "what if?" analyses, break-even analyses, and loan analyses. You can quickly transfer data from PFS:File into PFS:Plan, and easily include Plan output in PFS:Write documents. With the unique "target" feature, you can start with a desired result and let Plan tell you how to get there. PFS:Plan requires 128K, and works with the Apple II RAM Expansion Card and UniDisk 3.5. It sells for \$125, from Software Publishing, 1901 Landings Drive, Mountain View, CA 94043, (415) 962-8910. For more information circle number 353 on the Reader Service card.

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teaches while you play. Equations becomes more complex as you learn, and that creates problems for the other players. Eight-year-olds can play with simple arithmetic, but Equations expands to present concepts that will challenge intelligent adults. Students from primary school to high school have played with Equations and shown improvement in performance. Equations was created by The Instructional Gaming Group at the University of Michigan, and is available for \$44.95, from WFF 'N Proof Learning Games, 1490 South Boulevard, Ann Arbor, MI 48104, (313) 665-2269. For more information circle number 360 on the Reader Service card.


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Mouse Accounts

Mouse Budget joins Mouse Calc as the second in a series of low-cost mouse-based products from France. Mouse Budget manages your personal finances with flexible budgeting and accounting functions like income and expense summaries, credit-card and net-worth statements, tax statements, checkbook reconciliation, and more. All are easy to figure, with a mouse interface and pull-down menus in plain English. Double-entry techniques balance income and expense, but you need to enter each transaction only once. Mouse Budget requires a mouse and at least 128K of RAM. It works with the megabyte Apple IIe and UniDisk 3.5, too. Mouse Budget is priced at \$69.95, from International Solutions, 910 West Maude Avenue, Sunnyvale, CA 94086, (408) 773-0443. For more information circle number 352 on the Reader Service card.

To the Point

Pinpoint puts all the accessories you need into AppleWorks: a calculator, note pad, appointment calendar, communications software, envelope addresser, and "typewriter" module. A telephone dialer scans the screen for phone numbers and calls them. You can insert pictures and text into AppleWorks documents, too. The command structure is similar to that of AppleWorks, and Pinpoint works with Apple's new II RAM Expansion Card and the UniDisk 3.5. The price is \$69, from Pinpoint Software (formerly Virtual Combinatics), 2823 Steinmetz Way, Oakland, CA 94602, (415) 530-1726. For more information circle number 350 on the Reader Service card.

Cheat, Cheat

Leroy's Cheatsheets are plastic-laminated keyboard overlays designed for use with popular software, hardware, and languages for your Apple IIe. The commands are arranged by function in programs such as Applesoft BASIC, Apple Writer, and VisiCalc, and printers like Apple's ImageWriter. (There's even an overlay for Flight Simulator.) Blanks are available for programmers. Each overlay costs just \$5.95, from Cheatsheet Products, P.O. Box 111368, Pittsburgh, PA 15238, (412) 781-1551. For more information circle number 354 on the Reader Service card.



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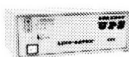
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REPS-TERRITORIES AVAILABLE

Product Updates

● Quark has dropped the price of **Word Juggler**, its word processor, from \$189 to \$99. Replacement keycaps have been replaced by stick-on decals and a stand-up reference card—that's what the customer wanted. Schools can now purchase student and teacher editions at \$79 and \$129.

● Spinnaker Software presents four interactive video programs for children, with titles like **Reading: The Search for the Stolen Sentence**, and **Math: Add Venture of the Time Taxi**. Spinnaker chairman Bill Bowman says that education in the home is a coming thing.

● Some Spinnaker games are teaching things Spinnaker never intended: Gessler Educational Software (New York, NY, 212-673-3113) imports translations of **Snooper Troops**, **In Search of the Most Amazing Thing**, **Kids on Keys**, and **KidWriter** (\$37.95 each) from France—a fun way to learn French, the way French kids do.

● Videx, makers of the **UltraTerm Video Display Card** for the Apple II, announces **AppleWorks Modifier**, a program for Apple II users who want to use AppleWorks in 80 columns—only \$59.

● CIE Terminals, has lowered the price of its multi-mode serial dot-matrix **Tri Printer** from \$1995 to \$1895. Buy now.

● Sorcim/IUS Micro Software—always a mouthful—has changed its name to Computer Associates Micro Products Division. Just say "**SuperCalc3a**."

● Juki Office Machines now offers four daisy-wheel printers for less than \$1000, with the introduction of the **Juki 6200** at \$475. Everybody's getting letter-quality.

● With the purchase of any one of its 20 educational software products, Learning Technologies (4255 LBJ, Dallas, TX 75244, 214-991-4958) will ship free of charge a new Learning Kit, with posters, lesson plans, worksheets, and class records. You could also win an Apple //c in a special Learning Technologies drawing.

● Quark has dropped the prices of its **QC10** (reviewed in "Hard-Driving Disks," September 1985, p. 25) and **QC20** hard-disk drives from \$1995 to \$1295, and \$2295 to \$1795, respectively. Maybe Quark feels price pressure from the "side"?

● "The Apple //c is not closed to anyone who owns a screwdriver," says Dan Pote of Applied Engineering. He expects to see more //c enhancements, like his company's **Z-RAM** card (see Editors' Choice, September 1985, p. 128) in the near future.

● Buy any three of the more than 50 software titles Spinnaker offers—including **Spinnaker**, **Fisher-Price**, **Telarium**, **Windham Classics**, and **Better Working Software**—and you can pick up a fourth package of your choice on the company.

● Broderbund's **Print Shop Graphics Library, Disk 2**, is ready, and it looks good—120 new designs, symbols, and pictures for **The Print Shop** for \$24.95.

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Notre Dame University's Apple user group runs a bulletin board that provides assistance to faculty, staff, and students. Topics include education software, tips for using Apple products, and campus activities. A special section of the board is devoted to Macintosh and Lisa questions. Use your modem and give the board a call at (219) 239-5875.

► **Sports Line**

Join the Racket Club bulletin board for play-by-play access to major-league standings, professional-sports schedules, book reviews, trivia quizzes, jokes, and technical advice. A three-month subscription costs \$15, but you can scout the board for free: Use your 300-baud modem to call (314) 725-0090 or your 1200-baud modem to call (314) 725-9555.

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► **Writers On Line**

Delphi offers a Writers and Editors Network with access to the service's standard data bases at a substantially reduced rate—a \$29.95 initiation fee versus the regular \$49.95 subscription fee. The service also lets writers store, edit, transmit, download and upload manuscripts; provide typeset copy; and advertise writings. Contact Delphi, General Videotex Corporation, 3 Blackstone Street, Cambridge, MA 02139, (800) 544-4005; in Massachusetts call (617) 491-3393.

► **Jewish Education**

The Golen bulletin board deals with Judaism, Jewish education, and Jewish-oriented software. The board is operated by Rabbi Alan Rosenbaum at the Institute of Computers in Jewish Life, 845 North Michigan Avenue, Chicago, IL 60611. Use your modem to call (312) 787-7865.

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► **Calling Sci-Fi Fans**

Science-fiction buffs can swap messages and information on UFONET, a Colorado-based bulletin-board system. Use your modem to call (303) 278-4244.

► Breakthrough

If you aren't a diehard data-base user, check BRS's BRKTHRU—a 24-hour, menu-driven service. BRKTHRU is less expensive than BRS's normal day service, because it doesn't tack on the \$8- to \$27-per-hour telecommunications charge incurred with the regular service.

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► Why Pay More?

Much of the information for which on-line services charge—sometimes at rates of up to \$100 an hour—you can obtain free elsewhere. You just have to be willing to wait for the organization to send you a printout. For example:

- You can access the Energy Data Base on Dialog and BRS through the U.S. Department of Energy at Oak Ridge, Tennessee, as well.
- Information concerning legislation contained in the data bases of Congressional Quarterly, Commerce Clearinghouse, and Legi-Slate is available from a free data base maintained by Congress.
- International demographics available from vendors such as I.P. Sharp, Data Resources, and Chase Econometrics are also accessible from the Bureau of the Census' free data base.
- Information regarding government grants on Control Data Corporation's system is also available at no cost from the same data base at the General Services Administration.

► Which Way to the Consulting Forum?

Companies searching for computer-consulting services or consultants looking for clients can use a bulletin-board system to fill their requirements. Consultants can list their qualifications and specialties; companies can outline their computer needs. The bulletin board is up on weekdays from 12 p.m. until 8 p.m. and 2 a.m. until 8 a.m. Weekends are on an "as available" basis. Use your modem to call (215) 649-5422. Write to Brian Raub at 14 Rolling Road, Overlook Hills, PA 19151, for more information.

► The Businessperson's Cliff Notes

Businesspeople must keep up with their reading, but time constraints often prevent it. ABI/Inform provides 200-word summaries of business information from more than 600 worldwide business and management publications. Topics range from computers to competitive intelligence. You can pay between \$50 and \$90 per hour for using the systems during the day from such vendors as VU/Text, 1211 Chestnut Street, Philadelphia, PA 19107, (800) 258-8080, or (215) 665-3300 in Pennsylvania; Information Handling Services, 15 Innverness Way East, Englewood, CO 80150, (800) 241-7824; or SDC Information Services, 2500 Colorado Avenue, Santa Monica, CA 90406, (800) 421-7229, or (800) 352-6689 in California.

You can save a bundle, though, with Innerline, Dialog's Knowledge Index, or BRS/AfterDark. Innerline's and Dialog's hourly day rates are \$24 and BRS/AfterDark's rate is \$15. For more information, contact Innerline at 95 West Algonquin Road, Arlington Heights, IL 60005, (800) 323-1321, in Illinois (800) 942-7835; Dialog's Knowledge Index at 3460 Hillview Avenue, Palo Alto, CA 94304, (800) 227-1927, in California (415) 858-2700; BRS/AfterDark at 1200 Route 7, Latham, NY 12110, (800) 833-4707, in New York (800) 553-5566.

Editor's note: If you can't connect with one of these data bases, it may be temporarily—or permanently—off the air. Many data bases are noncommercial ventures and can encounter financial difficulties. Feel free to contact Matthew Lesko if you continue to run into obstacles. ■

Matthew Lesko is the founder and president of Information USA, Inc., a computer data-base consulting and publishing company. He is the author of seven information books—two of which made the New York Times best-seller list. For a free copy of his newsletter on computer data bases, write to Information USA, Inc., 4701 Willard Avenue, #1707, Chevy Chase, MD 20815, or call (301) 657-1200.

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INDEX TO ADVERTISERS

Reader Service	Page	Reader Service	Page	Reader Service	Page
* Alf Products	156	147 Electronic Arts	95	14 Pirates Harbor	72
199 Alpha Logic Business Systems	89	148 Electronic Arts	31	49 Prof. Jones/Frogg House	138
75 American Mitac	80	161 Fiberbilt	42	128 Programs Plus	109
104 Analog Technology	152	132 First Class Peripherals	121	186 Public Domain Software	130
* Apple Computer	Insert at 32, 33	146 Golem Computers	92	234 Quadram	83
* Applied Engineering	16, 17, 29, 73, 77, 89, 91, 107, 113, 119, 135, 154	188 Great Game Products	22	155 Quality Software	36
216 AST Research	1	139 Gutenberg Software Ltd.	70	16 Quinsept	82
167 BACE	152	66 H & E Computronics	148	281 Quinsept	102
159 Baudville	55	76 Hardcore COMPUTIST	44	41 Quorum	72
179 Beagle Bros	155	229 High Order Micro	85	165 Roger Coats	127
35 Bible Research	85	* Human Systems Dynamics	34	250 Roger Wagner Publishing	20
209 Broderbund Software	25	inCider Magazine		46 Russ Systems	76
210 Broderbund Software	43	inCider Subscriptions	64	223 Sav-Soft Products	82
211 Broderbund Software	79	Foreign Dealers	102	84 Sensible Software	125
* Business Computers of Peterborough	93	Dealer Ad	54	143 Silicon Express	123
60 Central Point Software	11	University Microfilm	94	218 Sir-Tech	39
* CH Products	CII	Christmas Sub Ad	96	164 South-Western Publishing	21
149 Cheatsheet		hotCider Ad	112	* Southern California Research Group	103
227 Checkmate Technology	98, 99	* Inmac	114	99 Spectrum Holobyte	41
Classified Ads	142, 143	114 Instant Software	128	* Spinnaker Software	23, 60, 61, 62, 115
78 Coit Valley Computers	71	191 Intec	85	150 SSI Software	45
* Comb Company	86, 87	157 International		67 Stellation II	153
95 Companion Software	75	Apple Core	157	160 Strategic Simulations	84
124 CompuServe Information Services	2, 3	5 International Solutions	57	156 Sublogic	68
166 Computer Direct	104, 105	62 Kalglo Electronics	138	182 Sun Star Industries	131
48 Computer Friends	40	36 KWH Technology	94	221 Sweet Micro Systems	67
183 Computer Network	33	93 Learning Technologies	130	32 Thidware	74
89 Consistent Software	116	28 Legend Industries	30	170 Tricon Industries	156
163 Core Concepts	27	105 MECA	10, 11	264 Utilico Microware	24
* Covox	129	208 Micro City	78	197 Value Line	111
* Curtis Manufacturing	97	153 Microcomputer Games	7	135 Vilberg Bros Computing	94
* CW Communications	117	* Microsoft	115	7 Votrax	133
101 Data Technology	9	180 Midwest Software	108	116 Wayne Green	
144 Davka Corporation	143	126 Mindscape	CIII	Int'l Ltd.	66
184 Digital Vision	143	100 Nibble Notch	132	200 Woodbury Software	35, 82
108 Diversified Software	90	110 Northeastern Software	58, 59	174 Woodchuck Industries	153
30 Dow Jones News/Retrieval	100	192 Norwich Data Services	139	169 X - 10 USA	37
81 Eastcoast Software	89	136 Olympus	30	190 Zoom Telephonics	40
		42 Origin Systems	63		
		65 Orthro Information Services	CIV		
		31 Pacific Exchanges	152		
		* PC Network	158, 159		
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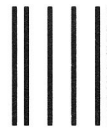
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127	132	137	142	147	327	332	337	342	347
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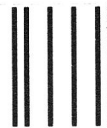
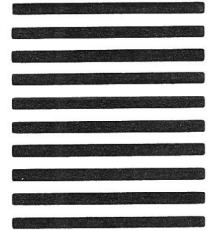
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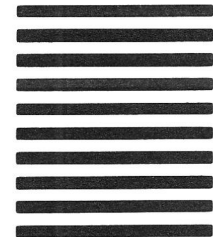
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GAME ROOM

by Brian J. Murphy

In *Game Room*, Brian Murphy reviews four to six of the most recent Apple games to hit the market. Look here for inCider's scoop on the latest fun.

Game Ratings

Boffo	★	★	★	★
Cut above	★	★	★	
Mundane	★	★		
Futile	★			

The Railroad Works

★★★

CBS Software

1 Fawcett Place
Greenwich, CT 06836
\$34.95

Any Apple II, 48K,
one disk drive
Joystick or mouse optional

Here's an original idea—simulating model trains—a simulation of a simulation, if you will. **The Railroad Works** lets you simulate a model-train set. With the Construct routines, you can build or remove an almost unlimited amount of track (**Photo 1**). Eight icons at the bottom of the Construct screen let you lay down or remove sections of track, add various items of scenery (buildings, bushes, trees, and shipping and receiving sites), look at the entire layout (which covers 12 computer screens), or exit the routine.

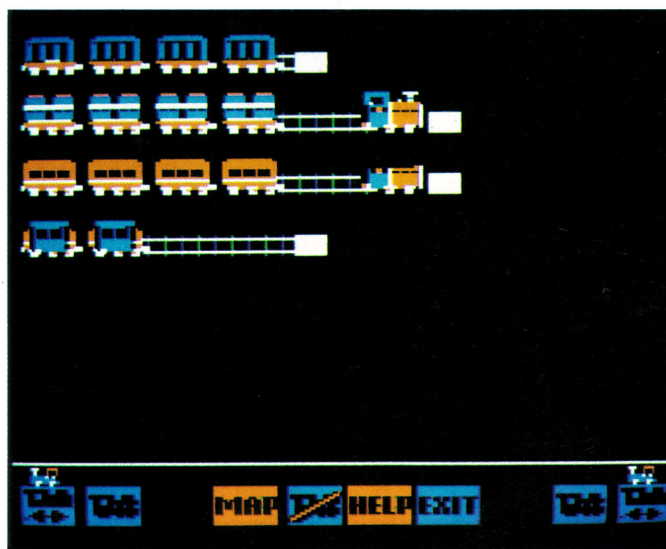


Photo 1. Build an empire with *The Railroad Works*.

When laying track, use your joystick, mouse, or keyboard to indicate the beginning and ending points of the track you're building. The track segment will appear automatically when you hit the fire button (on a joystick) or the space bar. If you want to delete any segment, select the erase icon and repeat the procedure.

Selecting the scenery icon gives you a menu of items. Move the cursor to the type of scenery desired, place a marker on the map where you want it to go, and fire (or press the space bar). You can very quickly fill all 12 sections with track, buildings, vegetation, and freight terminals. Once you have your layout the way you want it, you can exit to the main menu, select the save option, and store it on disk.

After all that work, running trains on the new track seems almost anticlimactic. The game begins by loading mid-19th-century rolling stock—steam engines with cow catchers, and so on. You can select the Change Engine and Cars option from the main menu, and you'll get mid-20th-century rolling stock and diesel engines.

Once you've picked your railroading era, link up your engine with freight cars in the marshalling yard at the top-left section of the map, and explore your railroad—the main lines, the side lines, and switches. You can run your trains in the Operate routine, for practice, or in the Play mode, in which the program scores your performance.

You earn points for staying on schedule, success-

fully picking up or discharging passengers and cargo, and moving cargo before it piles up to unacceptable levels (color codes at the various freight terminals tell you how much cargo is waiting). When hauling passengers, the rules are a little different. There is no end to the passengers you can pick up, and, as the manual points out, there is no penalty for not delivering them—just like the Long Island Railroad. At the end of play, the program evaluates your performance and ranks you somewhere between a coal chipper and an engineer, depending on your score.

This game seems like kid stuff because it is kid stuff. It was designed for ages 10 and up (although I suspect that if your 8-year-old were to load one of the preconstructed layouts on the game disk, he or she would have fun, too). But, as with real model trains, there'll be a certain fascination for older kids, as well—like Mom and Dad, for instance. The simulation is really accurate, once you've got your stock rolling down the line.

I have just one suggestion. If you have the money and the room (apartment dwellers are exempt from this), why not spend the money on real model trains instead? I have no argument with simulations when they re-create experiences that are too exotic, expensive, or hazardous to attempt otherwise, but toy trains don't fall into this category. I'd be willing to bet

that a single loop of track, an engine, and four or five cars will give you as much, if not more, of a thrill than this simulation, even though it's a good one. As much as we love computer games, there's a world of real experience out there, too.

Baltic 1985

★ ★ ★

Strategic Simulations

883 Sterlin Road, Building A-200
Mountain View, CA 94043

\$34.95

Any Apple II, 48K,

Applesoft, one disk drive

Apple III in emulation mode

Here's another episode in the continuing saga of World War III, as written by Roger Keating, and fought by NATO and the Warsaw Pact. In **Baltic 1985**, the improbable happens. A NATO force attempts to relieve the garrison in West Berlin. I say it's an improbable scenario because the Russian front line would probably be somewhere in suburban Amsterdam after a few days of battle.

The NATO troops include several battalions of infantry and minimal artillery support, swimming in a swelling sea of Russian tanks, Russian armored cars, Russian artillery, Russian rocket launchers—you get the picture. At the edge of the map, there's a force of NATO tanks, self-propelled howitzers, and armored infantry punching their way to the surrounded city, but will they make it in time?

They can, but only if you master the complex game system. Luckily, the master rulebook has been so thoroughly rewritten that instead of being SSI's worst player manual, it's now the company's best. It's easy to read and understand; the rules have been condensed

and reorganized so that you can immediately resolve any problem or question.

Baltic is a real challenge, even for advanced war-game players. You fight this battle at the battalion and regimental level, and it requires complex tactical thinking. You have to know how to call in preparatory artillery barrages, how to use forest and town for concealment (the game simulates actual East German terrain), how to maintain air superiority over the battlefield, whom to attack, and whom to bypass. You have to keep track of air attacks, call in support fire, and monitor the strength of dozens of units, while at the same time act as a traffic cop on roads congested with reinforcements and troops racing to the battle line.

I can't resist the temptation to tell you that I won the first two games I played with **Baltic 1985**. That puts me in a good position to offer tips on strategy. First, keep your infantry on the defensive in Berlin. The troops will last longer that way than if they are worn down in attacks. Wait for reinforcements before you attack. Keep advancing the self-propelled guns so that they're close to the action. Use your air-support points early in every move—it's easy to forget you have them. Destroy enemy artillery and tank units first, then take on motorized infantry.

I have grown very fond of Roger Keating's World War III war games (the other two are Germany 1985 and RDF 1985). They are always realistic, challenging, and exciting—once you've mastered the system.

A final note—you can play **Baltic 1985** alone, with the computer taking either the NATO or Soviet side.



Photo 2. The AL faces the NL in *Micro League Baseball*.

Micro League Baseball

★ ★ ★ ★

Micro League Sports Association

36 East Cleveland Avenue
Newark, DE 19771

Main game and manager's disks, \$39.95 each

World Series and All-Star teams, \$19.95

Franchise disks, \$29.95 each

Any Apple II, 48K,
one disk drive

World's Greatest Baseball Game

★ ★

Epyx Computer Software

1043 Kiel Court
Sunnyvale, CA 94089

\$39.95

Any Apple II, 64K,
one disk drive, joystick

You are in absolute control of the strategy in **Micro League Baseball** (MLB), the most advanced and detailed sport-simulation game to date for the Apple II series. MLB combines a full range of managerial decisions with superb, three-dimensional graphics, for a game that is more vividly realistic than any other baseball simulation I've seen.

The game disk has more than 20 teams from which to choose, including some of the greatest World Series teams, the "all-time" Phillies and Tigers teams (the program authors come from Philadelphia and Detroit, of course), and two wonderful clubs—the all-time American League and National League greats (**Photo 2**). For a thrill, you can match Cy Young or Walter "Big Train" Johnson against Sandy Koufax or Christy Mathewson.

Each player is designed to deliver true-to-life results. Sandy Koufax strikes out batters in batches; Reggie Jackson and Babe Ruth hit tape-measure homers. Willie Mays makes some startling catches, while Ty Cobb consistently hits the ball and burns up the base paths.

You should be able to master MLB's operation in about 15 minutes. You have four different pitches—a fastball, curve, slider, and the changeup. You can walk a batter in order to pitch to the next man. You can order a pitchout if a stolen base is coming. You can move the infield in for a double play, or just the first and third basemen to guard the corners. You can



Photo 3. The '27 Yankees are at bat in WGBG.

visit the mound to rest the pitcher or call in a relief.

When playing offense, your options are limited to swinging or bunting if no one is on base. When you have at least one man on base, though, you can call for aggressive or "safe" running, a steal, or the hit and run (assuming your batter is able to hit behind the runner). If you have only one out and a runner on third, a sacrifice bunt could score a run. Late in the game, when your pitcher comes to bat, you have a pinch-hitter option. If he reaches base, you can pull your pinch hitter and install a pinch runner.

Mastering baseball strategy could take you a lifetime. It seems as if the computer manager against whom you play never makes a mistake. So unless you're pitting a powerhouse team, like the '27 Yanks, against a much weaker club, like the '69 Mets, you won't be able to win by packing a lineup with power hitters and relying on them to hit as many runs as you need to win. You'll have to use your players and your options creatively, and, as you've seen, you have a very real-

istic arsenal of options at your disposal.

The hi-res color video display is the best I've seen in any home-computer baseball game. Your point of view originates where it should, from behind the plate. The use of shadow and perspective creates a convincing 3-D effect. Smooth, flicker-free animation adds to the realism—with players sliding into base, making catches, and relaying throws.

The Micro League Sports Association offers supplementary "franchise" disks for each of the 26 current major-league clubs. Each disk contains ten outstanding teams from each franchise, and an "all-time greats" team. Also available are a disk with World Series and All-Star teams and a manager's disk, which allows you to custom-build teams based on current rosters. MLB really has it all—strategy, great graphics, realism, excitement, and matches made in heaven.

On the other hand, the Epyx title, **The World's Greatest Baseball Game** (WGBG), is an example of wishful thinking, rather than accurate description. Perhaps a better title would have been "The World's

Most Average Baseball Game."

WGBG is really two games. One is a challenging arcade game, and the other is a so-so "statistical" game. The arcade version, played with a joystick, gives you high, low, fast, and slow pitches, with options for knuckleballs and curveballs. When a player hits the ball, you must activate both a fielder to catch and throw the ball and the player to whom it will be thrown. Playing the arcade version requires good reflexes and split-second judgment (**Photo 3**).

The statistical game requires no arcade skills—the computer makes all plays automatically. It's far less interesting, and no match for the richly detailed MLB strategy game. You can't choose pitches, but you can call for a walk and bring the infield in. On offense, you can swing, hit and run, steal, bunt, or sacrifice.

Compare WGBG's options with MLB's and you'll know why WGBG is rated so far behind the other game. The strategy game earns nothing at all, to be honest. The rating is based solely on the merits of the arcade game.

Wishbringer

★★★

Infocom

125 Cambridge Park Drive
Cambridge, MA 02140
\$39.95

Any Apple II, 48K,
one disk drive

You say you've never played a computer adventure game? Try **Wishbringer**—there's no better introduction to the richness of adventure-gaming experience than this beautiful, imaginative game.

Like all Infocom games, *Wishbringer* is text only, but you'll never miss the graph-

ics. Infocom packs more color and realism into one of its text-only interactive-fiction games than you'd normally find in a dozen illustrated adventures.

In *Wishbringer*, you are employed at the Festeron post office, where you're given a letter to deliver to the "joke shop" over on the other side of the town. But getting there isn't easy—you'll have to find a way past a bloodthirsty poodle and the shuddery confines of a graveyard, among other things.

Returning to the village, you'll find many sinister changes. In the shadows of the night a hundred dangers lurk, including relentless secret police and a master wizard you must somehow outwit. You have one powerful weapon, the *Wishbringer*, a magic stone that can save you—or doom you.

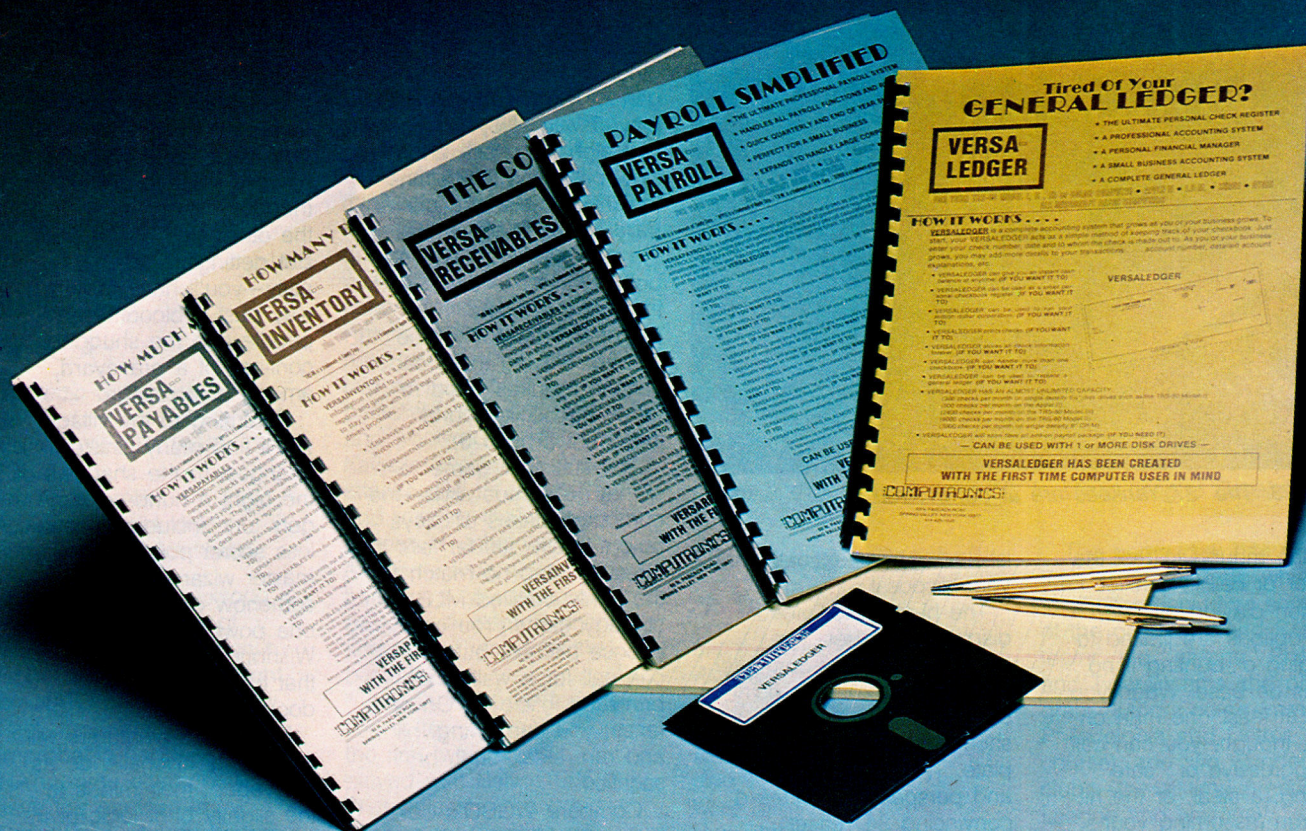
First-time adventurers will find plenty of challenge as they adapt their minds to the slightly bent logic of interactive fiction. They'll also be impressed by the strong sense of atmosphere the program creates and by the accessories that come packed with the game (a map, a mysterious letter, and an enigmatic stone). I'd be willing to bet that more than a few experienced adventurers will find themselves charmed by this spellbinding game.

Now, remember your duty as a letter carrier—through rain, snow, sleet, and hail, past ogres, trolls, and demons, let nothing stop you from the swift completion of your appointed rounds. ■

What do you think of today's Apple II games? Are they worth the money or the time spent playing them? Write to Brian Murphy at inCider, 80 Pine Street, Peterborough, NH 03458, and let him know your opinion.

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INCIDER'S 2-BIT PROGRAMMING CONTEST:

Winners Announced!

Hundreds of you answered *inCider's* challenge to test your programming skill and creativity by entering the 2-Bit Programming Contest we announced in the June 1985 issue (p. 116). After wading through all the responses—playing the games, watching the graphics, and trying out the utilities—Bob Ryan, our technical editor, selected what he considers the best of the two-line Applesoft programs submitted.

The Envelope, Please

First Prize—\$200—goes to David Shaad of Liberal, Kansas. David's program, Two-Bit Turtle, is a turtle-graphics system in two lines of Applesoft code. Despite its simplicity, it retains the essence and educational value of Logo's full-blown turtle graphics.

Mike Oropeza of San Jose, California, wins the Second Prize of \$100 for ProDATE, a ProDOS date-stamping utility. For ProDOS users who don't own a hardware clock, Mike recommends you use his utility as your ProDOS Startup program.

Third place and \$50 goes to Vincent Occhipinti of Fort Worth, Texas. Vincent has created a program, Master Cataloger, that reads the directories of any number of DOS 3.3 disks and writes the file names to a text file. You can then use any word processor to print this text file, creating a master catalog of all your DOS 3.3 files and disks.

Typing in the Listings

When you enter these listings, be sure to type a question mark (?) in place of the PRINT key word, and don't use spaces except when they appear in literal strings. In addition, the Master Cataloger listing contains a number of control-D's that wouldn't normally appear in a listing, since that character is nonprintable. When you come across a control-D in the listing, don't type in CONTROL-D—rather, hold down the control key and hit the D key.

Running the Programs

Two-Bit Turtle gives you five command options—F(oward), B(ackward), T(urn), C(olor), and clear S(creen). The C command toggles the drawing color between black and white, so you can move the turtle without drawing a line, if you prefer. The S command clears the screen. The F

command, followed by a number (F20, for example), moves the turtle in the direction indicated. The B command moves the turtle in the direction opposite the current heading. Change the heading by typing Tn, n being the number of degrees you want to turn the turtle.

When you run ProDATE, the program prompts you to type in the date in DD-MM-YY format. After you run the program, any file you create or save will be stamped with the proper date.

Master Cataloger presents you with a simple "?" when you run the program. It creates a master-catalog text file on the disk in drive 1, and reads the directories of disks from drive 2. At the "?" prompt, put the DOS 3.3

disk you want to include in the master catalog into drive 2. Then hit the return key or type in a name for the disk—Utilities Disk, for example. Master Cataloger then incorporates the directory of the disk in drive 2 into the master catalog. The header "Utilities Disk" will precede the disk directory when it appears in the master. When you've included all the disk directories you want, escape from the program by hitting control-reset. The master catalog is contained in a text file named V. You can then use a word processor or write a simple BASIC program to give you a hard copy of your master catalog.

Congratulations to the winners, and thanks to everyone who participated in *inCider's* 2-Bit Programming Contest. ■

Listing 1. The Winner! Two-Bit Turtle.

```
1 C = C - 2 * (C = 5): HCOLOR = C: H = H - 360 * (H > 360): VTAB 22: PRINT
  "X="; INT (X); "Y="; INT (Y); "HEADING "; H; "COLOR "; C; " ": IF F = 0 THEN
  HGR : HOME : X = 139: Y = 79: C = 3: H = 0: R = - 3.1415927 / 180: F = 1:
  GOTO 1

2 INPUT A$: B$ = MID$ (A$, 1, 1): V = VAL ( MID$ (A$, 2)): C = C + (B$ = "C"): H = H
  + (B$ = "T") * V: D = ((B$ = "F") - (B$ = "B")) * V: U = D * COS (H * R) *
  1.3: V = D * SIN (H * R): E = (X + U > 0) * (X + U < 280) * (Y + V > 0) * (Y +
  V < 160): U = E * U + X: V = E * V + Y: HPLOT X, Y TO U, V: X = U: Y = V: F = (B$
  < > "S"): GOTO 1
```

Listing 2. Second Prize! ProDATE.

```
10 PRINT : PRINT "ENTER DATE:": PRINT " DD-MM-YY": INPUT Q$: D = VAL ( LEFT$
  (Q$, 2)): M = VAL ( MID$ (Q$, 4, 2)): Y = VAL ( RIGHT$ (Q$, 2)): IF D < 1 OR M < 1 OR
  Y < 0 OR D > 31 OR M > 12 OR Y > 99 OR (M = 2 OR M = 4 OR M = 6 OR
  M = 9 OR M = 11) AND D = 31 OR D = 30 AND M = 2 OR LEN (Q$) < > 8
  THEN PRINT "ILLEGAL DATE!" CHR$ (7): GOTO 10

20 FOR N = 1 TO M: READ Q$: NEXT : Q1 = 2 * Y + (M > 7): M = M - 8 * (M >
  7): Q0 = 32 * M + D: POKE 49040, Q0: POKE 49041, Q1: D$ = STR$ (D) + "." + Q$
  + "-" + STR$ (Y): IF Y < 10 THEN D$ = LEFT$ (D$, 6 + (D > 9)) + "0" + STR$
  (Y): DATA JAN, FEB, MAR, APR, MAY, JUN, JUL, AUG, SEP, OCT, NOV, DEC
```

Listing 3. Third Prize! Master Cataloger.

```
4 PRINT "control-DOPENV,D1": ON NOT J GOTO 8: A$(0) = C$ + "": Z = PEEK (L) +
  PEEK (108) * J + 8: POKE 209, PEEK (Z): POKE 210, PEEK (Z + 1): POKE Q, 0:
  POKE Q + 1, 3: POKE Q + 2, 18: POKE Q + 3, 3: PRINT "control-D"C$: PRINT
  "control-DPR#0": PRINT "control-DIN#0": PRINT "control-DAPPENDV,D1": PRINT
  "control-DWRITEV": PRINT V$: FOR F = 1 TO 85: IF LEFT$ (A$(F), 1) < > " " THEN
  PRINT A$(F): NEXT

8 PRINT : PRINT "control-DCLOSE": FOR G = 768 TO 788: READ P: POKE G, P: NEXT :
  CLEAR : DIM A$(85): C$ = "          CATALOG,D2  ": INPUT V$: J = 256: Q = 43603: L
  = 107: FOR H = 85 TO 1 STEP - 1: A$(H) = C$ + C$: NEXT : GOTO 4:
  DATA 56, 72, 132, 208, 160, 0, 145, 209, 230, 209, 208, 2, 230, 210, 104, 164, 208, 96, 169, 160, 96
```

HINTS/TECHNIQUES

Apple users know that there's always an easier way to get the job done. A shortcut here, an elegant twist there. That's what Hints/Techniques is all about. It's an information swap for readers who want to share their programming pointers, DOS tips, hardware secrets, AppleWorks applications, WPL enhancements, and all those other insights that make you go "Aha!" in the night. So read on and see if you don't find just the solution you've been looking for.

Portal Update

by Brian J. Parry

Yes, I did windows. My first job for *inCider* was "Doing Windows" (February 1985, p. 54)—a windowing routine called Portal that lets you prepare programs for window displays without destroying underlying text. I wrote the routine in 40-column mode, but many people requested an 80-column version. To oblige, I wrote Portal2e.

Portal2e (**Listing 1**) is a text-windowing routine similar to Portal. You can stack up to three windows on screen simultaneously. And now, the windows can be 80 by 23 characters in size. As in the original Portal routine, the actual window interior is smaller than the specified dimensions because borders occupy space on the top, bottom, and sides of the window. The shrinkage is four spaces horizontally and two spaces vertically. A 40-by-12 window, then, will have interior scroll dimensions of 36 by 10 characters.

The New Way

To start, type in **Listing 1** and save it with:

```
BSAVE PORTAL2E OBJ,A$7C00,L$1DC
```

Before you can use the routine in your program, you must tend to set-up work. Make the first line of your program:

```
10 PRINT CHR$(4)"BLOAD PORTAL2E
OBJ,A$7C00 : HIMEM:31743: POKE
768,0:POKE 1014,0:POKE 1015,124:
PR#3:CALL -22447
```

This loads the routine and initializes some pointers. To open a window on the screen, use the command: &,O,l,e,w,d,t,p,l,n. The O stands for "open" and l,e,w,d,t,p, and l,n represent window left edge, width, top, and length, respectively. These four parameters can be any value that will create a number. See **Listing 2** for an example.

Close the Window

To close a window, use &,C—where C indicates "close." Also notice that you don't need any parameters to close a window. Remember that the routine places windows on top of each other, so if you include the statement above, the top-most window will close.

Listing 3 is a small patch, or en-

hancement, to the original Portal program. It lets the original Portal routine, like Portal2e, accept ampersand commands.

Enter **Listing 3**, then save it with:

```
BSAVE PORTAL PATCH OBJ,A$320,L$37
```

Make the first lines in your program:

```
10 PRINT CHR$(4)"BLOAD PORTAL
OBJ,A$9400 : PRINT CHR$(4)
"BLOAD PORTAL PATCH OBJ,A$320"
20 HIMEM:34815:POKE 768,0:POKE
1014,32: POKE 1015,3
```

The command that activates the windows in Portal2e will work for the original Portal. **Listing 4** shows how to use the original Portal with the new patch. Just remember that the Portal2e routine is for 80 columns, while the Portal routine with its new patch is for 40 columns. ■

Write to Brian J. Parry at 1115 West Sacramento Avenue, #39, Chico, CA 95926.

Listing 1. Portal2e.

7C00-	18	20	B1	00	B0	01	60	8D
7C08-	19	03	20	67	DD	AD	19	03
7C10-	C9	43	F0	1F	C9	4F	D0	EE
7C18-	20	F5	E6	8E	01	03	20	F5
7C20-	E6	8E	02	03	20	F5	E6	8E
7C28-	03	03	20	F5	E6	8E	04	03
7C30-	4C	C5	7C	20	4A	FF	AD	00
7C38-	03	C9	00	F0	5D	CE	00	03
7C40-	20	D0	7D	20	AF	7D	18	AD
7C48-	16	03	69	04	8D	16	03	8D
7C50-	01	C0	8D	55	C0	20	AF	7D
7C58-	8D	54	C0	EE	00	03	AD	00
7C60-	03	20	D4	7D	38	AD	16	03
7C68-	8D	18	03	E9	04	8D	16	03
7C70-	18	AA	A0	00	BD	09	03	99
7C78-	20	00	EC	18	03	F0	05	E8
7C80-	C8	4C	74	7C	CE	00	03	AE
7C88-	00	03	BD	05	03	8D	25	00
7C90-	20	22	FC	20	3F	FF	4C	51
7C98-	A8	60	20	2D	FF	20	2D	FF
7CA0-	20	3F	FF	60	20	39	FB	A2
7CA8-	00	BD	BC	7C	C9	AA	F0	07
7CB0-	20	F0	FD	E8	4C	A9	7C	A2
7CB8-	35	4C	12	D4	D7	C9	CE	C4
7CC0-	CF	D7	BA	AD	AA	20	4A	FF
7CC8-	AD	00	03	C9	03	F0	CB	AD

Listing 1 continued.

Listing 1 continued.

```

7CD0- 01 03 18 6D 02 03 E9 50
7CD8- 10 CA AD 02 03 38 E9 06
7CE0- 30 C2 18 AD 03 03 6D 04
7CE8- 03 E9 17 10 B7 AD 04 03
7CF0- 38 E9 03 30 AF AD 00 03
7CF8- 20 D4 7D 18 AD 03 03 6D
7D00- 04 03 8D 17 03 AE 00 03
7D08- AD 25 00 9D 05 03 AD 16
7D10- 03 AA 18 69 04 8D 18 03
7D18- A0 00 B9 20 00 9D 09 03
7D20- EC 18 03 F0 05 C8 E8 4C
7D28- 1A 7D 20 D0 7D 20 8E 7D
7D30- AD 16 03 18 69 04 8D 16
7D38- 03 8D 01 C0 8D 55 C0 20
7D40- 8E 7D 8D 54 C0 38 AD 16
7D48- 03 E9 04 8D 16 03 AD 03
7D50- 03 8D 22 00 AD 17 03 8D
7D58- 23 00 AD 02 03 8D 21 00
7D60- AD 01 03 8D 20 00 20 80
7D68- FE 20 58 FC CE 23 00 EE
7D70- 22 00 38 AD 21 00 E9 04
7D78- 8D 21 00 EE 20 00 EE 20
7D80- 00 20 84 FE 20 58 FC EE
7D88- 00 03 20 3F FF 60 A9 00
7D90- 85 3C 85 42 A9 CF 85 3E
7D98- A9 04 85 3D 18 69 03 85
7DA0- 3F AD 16 03 18 69 7E 85
7DA8- 43 A0 00 20 2C FE 60 A9
7DB0- 00 85 3C 85 42 A9 CF 85
7DB8- 3E A9 04 85 43 AD 16 03
7DC0- 18 69 7E 85 3D 18 69 03
7DC8- 85 3F A0 00 20 2C FE 60
7DD0- AD 00 03 0A 0A 0A 8D 16
7DD8- 03 60 00 00 FA

```

End of listing.

Listing 2. Portal2e demonstration for 80 columns only.

```

10 REM *****
20 REM * PORTAL2E DEMO FOR 80 COL ONLY *
30 REM *****
100 PR# 3: HIMEM: 31743: POKE 768,0: CALL - 22447
110 PRINT CHR$(4)"BLOAD PORTAL 2E OBJ,AS$7C00": POKE
    1014,0: POKE 1015,124
120 LIST :LE = 0:WD = 80:TP = 8: LN = 8
130 REM "O" TO OPEN WINDOW
140 & ,O,LE,WD,TP,LN: REM USING VARIABLES
150 GOSUB 500
160 & ,O,30,30,0,23: REM USING CONSTANTS
170 GOSUB 500
180 & ,O,LE + 10,WD / 2,TP - (3 * 2),8 * 2: REM USING
    EXPRESSIONS
190 GOSUB 500
200 REM "C" TO CLOSE WINDOW
210 FOR I = 1 TO 3: & ,C: GOSUB 500: NEXT
220 GOTO 130
500 LIST : LIST : RETURN

```

Listing 3. Portal patch.

```

0320- 18 20 B1 00 B0 01 60 8D
0328- 1B 03 20 67 DD AD 1B 03
0330- C9 43 F0 1F C9 4F D0 EE
0338- 20 F5 E6 8E 01 03 20 F5
0340- E6 8E 02 03 20 F5 E6 8E
0348- 03 03 20 F5 E6 8E 04 03
0350- 4C 91 94 4C 00 94 00

```

Listing 4. Portal demonstration for 40-column text using the portal patch.

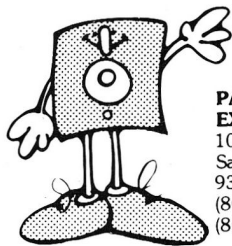
```

10 REM *****
20 REM * PORTAL DEMO *
30 REM * FOR 40 COL TEXT *
40 REM * USING THE PORTAL *
50 REM * PATCH *
60 REM *
70 REM * BY BRIAN J PARRY *
80 REM *****
90 REM
100 HIMEM: 34815: POKE 768,0: PRINT
    CHR$(4)"BLOAD PORTAL OBJ,
    AS$9400": PRINT CHR$(4)"BLOAD
    PORTAL PATCH OBJ,AS$320"
110 POKE 1014,32: POKE 1015,3: REM
    SET AMPERSAND VECTOR
120 TEXT : HOME
130 LE = 0:WD = 40:TP = 5:LN = 10
140 REM USE "O" TO OPEN WINDOW
150 & ,O,LE,WD,TP,LN: REM USING
    VARIABLES
160 GOSUB 500
170 & ,O,10,20,0,23: REM USING
    CONSTANTS
180 GOSUB 500
190 & ,O,2 * 3,3 * 5 + (WD / 40), TP
    - 3,LN + 4: REM USING
    EXPRESSIONS
200 GOSUB 500
210 FOR I = 1 TO 3
220 REM USE "C" TO CLOSE
    WINDOW
230 & ,C
240 GOSUB 500: NEXT : GOTO 130
500 LIST : LIST : RETURN

```

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HINTS/TECHNIQUES

Multipage Dump

by Oswin A. Wilson

Although I've used a number of routines other Apple enthusiasts have developed, programming in assembly language has always intimidated me. Necessity, though, drove me to dabble in it—to modify T. Ogasawara's "Apple Page Dump" program, published in the January 1984 issue of *inCider* (p. 157).

The original program allows you to dump only one page of memory in two successive actions. If you want to view subsequent pages, you must re-enter the command sequence at the Monitor level. If you call the routine from a BASIC program, you must set up a loop with the beginning and ending pages as its limits.

I needed a routine at the Monitor level that would dump an unspecified number of pages of memory, and require the user to press only a single key.

After studying Ogasawara's listing, attempted to make the routine recycle. This allows you to dump the next page of memory, provided the page number is incremented. Apart from the value in byte \$0344, you don't have to make any alterations before address \$0358, where you remove the EXIT.

After completing the first page dump, the program increments the page number stored in \$FF by one and goes into a keyboard-entry routine. First, the program clears the keyboard strobe by loading zero into \$C010, then checks \$C000 for keyboard entry. When you press the escape key, the routine exits through \$0372. Pressing the space bar makes the operation loop to \$0304 if the routine has already dumped the whole page (that is, the value in \$FE is zero); otherwise it loops to \$0345 to dump the second portion of the current page.

For a rapid scan, hold down the space bar on the IIe and IIc. (On the II Plus, you must also press the repeat key at the same time.)

At \$0372, the routine clears the keyboard before it exits to the Monitor level, or to the BASIC program that CALLED it.

After you modify the routine, you can still relocate it; you've added only 18 bytes to its length, for a total of 120. The same commands access the new routine: FF:pg N 300G at the Monitor level, and POKE 255,pg:

CALL 768 from BASIC, if the routine is located at \$0300, as assembled.

Enter the routine from the Monitor level, and save it to disk with the command BSAVE MULTIPAGE.DUMP, A\$300,L\$78.

Listing 5 is a printout of the routine, as disassembled by the Monitor. The Figure shows two pages of memory produced by this routine.

I've altered this code to ensure that it doesn't overwrite the Applesoft reset vectors, which begin at \$03D0. The current version of the code finishes at \$0377, for a total of 119 bytes. A more experienced assembly-language programmer should be able to improve it further. In the meantime, it performs its designated task faster than a BASIC routine—and it's also given me a sense of achievement. ■

Write to Oswin A. Wilson at 50 Poinciana Avenue, Yeppoon, Queensland 4703, Australia.

Listing 5. Multipage dump, as disassembled by the Apple Monitor.

0300-	A0 00	LDY	#\$00
0302-	84 FE	STY	\$FE
0304-	A5 FF	LDA	#\$FF
0306-	A6 FE	LDX	#\$FE
0308-	20 41 F9	JSR	\$F941
030B-	A9 BA	LDA	#\$BA
030D-	20 ED FD	JSR	\$FDED
0310-	A9 A0	LDA	#\$A0
0312-	20 ED FD	JSR	\$FDED
0315-	B1 FE	LDA	(\$FE),Y
0317-	20 DA FD	JSR	\$FDDA
031A-	C8	INY	
031B-	C0 08	CPY	#\$08
031D-	D0 F1	BNE	\$0310
031F-	A9 A0	LDA	#\$A0
0321-	20 ED FD	JSR	\$FDED
0324-	A0 00	LDY	#\$00
0326-	A2 00	LDX	#\$00
0328-	B1 FE	LDA	(\$FE),Y
032A-	C9 20	CMP	#\$20
032C-	90 08	BCC	\$0336
032E-	C9 A0	CMP	#\$A0
0330-	B0 06	BCS	\$0338
0332-	C9 80	CMP	#\$80
0334-	90 02	BCC	\$0338
0336-	A9 A0	LDA	#\$A0
0338-	09 80	ORA	#\$80
033A-	20 ED FD	JSR	\$FDED
033D-	E6 FE	INC	#\$FE
033F-	A5 FE	LDA	#\$FE
0341-	C9 A0	CMP	#\$A0
0343-	F0 15	BEQ	\$035A
0345-	E8	INX	
0346-	E0 08	CPX	#\$08
0348-	D0 DE	BNE	\$0328
034A-	A9 A0	LDA	#\$A0
034C-	20 ED FD	JSR	\$FDED
034F-	A9 8D	LDA	#\$8D
0351-	20 ED FD	JSR	\$FDED
0354-	A5 FE	LDA	#\$FE

Figure. Two successive pages of memory produced by the multipage dump in Listing 5.

```

FF:8 N 300G
0800: 00 19 08 0A 00 B2 20 20 2 -- DOS 3
0808: 2D 2D 20 44 4F 53 20 33 .3 HELLO
0810: 2E 33 20 48 45 4C 4C 4F 2
0818: 00 20 08 14 00 B2 20 00 ( :
0820: 28 08 1E 00 89 3A BA 00 . ( Y
0828: 2E 08 28 00 97 00 59 08 2 : "DOS
0830: 32 00 BA 22 44 4F 53 20 2 VERSION
0838: 56 45 52 53 49 4F 4E 20 3.3
0840: 33 2E 33 20 20 20 20 20 0
0848: 20 20 20 20 20 20 20 30 8/25/80"
0850: 38 2F 32 35 2F 38 30 32 < :
0858: 00 8B 08 3C 00 BA 3A BA "APPLE I
0860: 22 41 50 50 4C 45 20 49 I PLUS O
0868: 49 20 50 4C 55 53 20 4F R ROMCAR
0870: 52 20 52 4F 4D 43 41 52 D SYST
0878: 44 20 20 20 53 59 53 54 EM MASTE
0880: 45 4D 20 4D 41 53 54 45 R" F 2
0888: 52 22 00 92 08 46 00 B2 4 P 2
0890: 20 00 B4 08 50 00 B2 20 --POKE L
0898: 2D 2D 50 4F 4B 45 20 4C ANGUAGE
08A0: 41 4E 47 55 41 47 45 20 CARD FIN
08A8: 43 41 52 44 20 46 49 4E DER Z
08B0: 44 45 52 00 05 09 5A 00 9768,0:9
08B8: B9 37 36 38 2C 30 3A B9 769,173:
08C0: 37 36 39 2C 31 37 33 3A B9 9770,0:9
08C8: B9 37 37 30 2C 30 3A B9 771,224:
08D0: 37 37 31 2C 32 32 34 3A 9772,72:
08D8: B9 37 37 32 2C 37 32 3A 9773,173
08E0: B9 37 37 33 2C 31 37 33 9774,12
08E8: 3A B9 37 37 34 2C 31 32 9:9775,1
08F0: 39 3A B9 37 37 35 2C 31 92:9776,
08F8: 39 32 3A B9 37 37 36 2C 104: W
0900: 31 30 34 3A 00 57 09 5F 9777,72
0908: 00 B9 37 37 37 2C 37 32 9778,20
0910: 3A B9 37 37 38 2C 32 30 5:9779,0
0918: 35 3A B9 37 37 39 2C 30 9780,22
0920: 3A B9 37 38 30 2C 32 32 4:9781,2
0928: 34 3A B9 37 38 31 2C 32 08:9782,
0930: 30 38 3A B9 37 38 32 2C 35:9783,
0938: 33 35 3A B9 37 38 33 2C 173:9784
0940: 31 37 33 3A B9 37 38 34 131:978
0948: 2C 31 33 31 3A B9 37 38 5,192: +
0950: 35 2C 31 39 32 3A 00 AB d 9786,
0958: 09 64 00 B9 37 38 36 2C 173:9787
0960: 31 37 33 3A B9 37 38 37 131:978
0968: 2C 31 33 31 3A B9 37 38 8,192:97
0970: 38 2C 31 39 32 3A B9 37 89,169:9
0978: 38 39 2C 31 36 39 3A B9 790,165:
0980: 37 39 30 2C 31 36 35 3A 9791,141
0988: B9 37 39 31 2C 31 34 31 9792,0:
0990: 3A B9 37 39 32 2C 30 3A 9793,208
0998: B9 37 39 33 2C 32 30 38 9794,20
09A0: 3A B9 37 39 34 2C 32 30 5: { i 9
09A8: 35 3A 00 FB 09 69 00 B9 795,0:97
09B0: 37 39 35 2C 30 3A B9 37 96,208:9
09B8: 39 36 2C 32 30 38 3A B9 797,208:
09C0: 37 39 37 2C 32 30 38 3A 9798,19:
09C8: B9 37 39 38 2C 31 39 3A 9799,74:
09D0: B9 37 39 39 2C 37 34 3A 9800,141
09D8: B9 38 30 30 2C 31 34 31 9801,0:
09E0: 3A B9 38 30 31 2C 30 3A 9802,208
09E8: B9 38 30 32 2C 32 30 38 9803,20
09F0: 3A B9 38 30 33 2C 32 30 5: N n 9
09F8: 35 3A 00 4E 0A 6E 00 B9

```



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For picture-perfect pictures, you simply load screens into the primary and secondary hi-res pages, then BRUN or CALL PICCOM, **Listing 6**. It's easy, but you must first make a choice. There are three statement versions, each of which differs from the others by a number, depending on whether you want to AND, OR, or EOR your picture.

The statement AND comes out as IF X=1 AND Y=1 THEN Z=1; OR

```

300:AD 50 C0 AD 52 C0 AD 54 C0 AD 57 C0 A9 FF 85 18 A9 3F
      85 19 A9 FF 85 1A A9 5F 85 1B A0 00 B1 18 51 1A 9 18
      C6 18 C6 1A D0 EF A9 FF 85 18 85 1A C6 19 C6 1B A9 19
      C5 19 D0 DF AD 53 C0 60
    
```

turns out to be IF X=1 OR Y=1 THEN Z=1; EOR translates as IF X<>Y THEN Z=1. (X is screen 1, Y screen 2, and Z the blend.)

The 33rd number in the listing changes with AND, OR, and EOR—it's a 51, 11, or 31, depending on the number you input into the machine-language program.

Before you can type in the code, you must type CALL -151.

Type BSAVE PICCOM,A\$300,L\$40 to save the program. The 33rd number is at \$320. The program needs pictures in both hi-res locations and will store the meld in the first page.

Listing 6. PICCOM.

Simply BRUN or BLOAD it and use CALL 768 to merge your drawings.

This short machine-language program should appeal to both the graphics artist and the graphics programmer. With PICCOM, good things do come in small packages. ■

Address correspondence to Carl Steadman at RD#1, Dent, MN 56528.

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- Manual contains sample applications

A/D SPECIFICATIONS

- 0.3% accuracy
- On-board memory
- Fast conversion (.078 MS per channel)
- A/D process totally transparent to Apple (looks like memory)
- User programmable input ranges are 0 to 10 volts, 0 to 5, -5 to +5, -2.5 to +2.5, -5 to 0, -10 to 0.

The A/D process takes place on a continuous, channel sequencing basis. Data is automatically transferred to its proper location in the on-board RAM. No A/D converter could be easier to use.

D/A SPECIFICATIONS

- 0.3% accuracy
 - On-board memory
 - On-board output buffer amps can drive 5 MA
 - D/A process is totally transparent to the Apple (just poke the data)
 - Fast conversion (.003 MS per channel)
 - User programmable output ranges are 0 to 5 volts and 0 to 10 volts
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X+Z,Y: NEXT Y,X

20 POKE 37,255

COSCB 94

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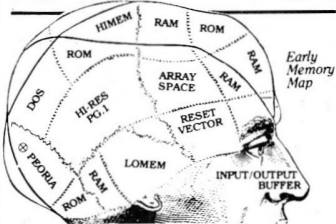
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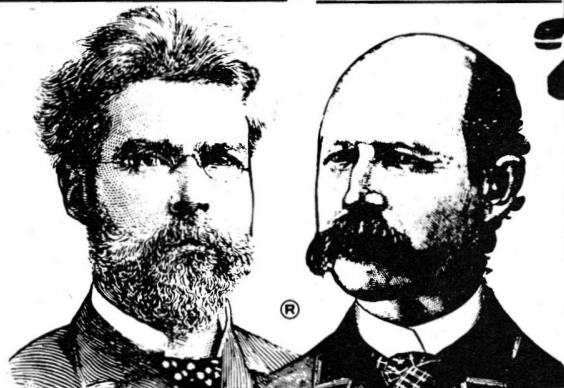
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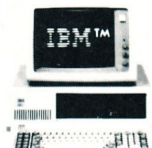
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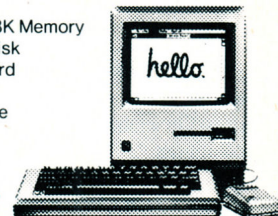
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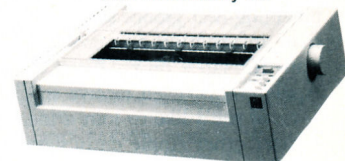
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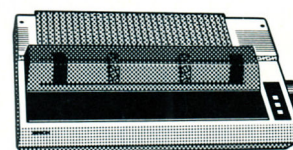
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EDITORS' CHOICE

Every month, hardware and software manufacturers release dozens of new products into the Apple II market. Editors' Choice singles out one product each month that the inCider editors feel is a significant addition to the Apple II family of products. Products evaluated in Editors' Choice are among the most recent releases and may not be available yet for retail distribution.

This month's Editors' Choice, the new **Apple Personal Modem**, is something of a breakthrough for Apple Computer. As you would expect, the Personal Modem is a quality product. What you might not expect is the price: The Personal Modem costs only \$399.

The 300/1200-baud Personal Modem lets your Apple use ordinary telephone lines to communicate with other computers. An external modem that connects to your computer via an RS-232 line, Apple's new product emulates both the older Apple modems and the Hayes Smartmodem.

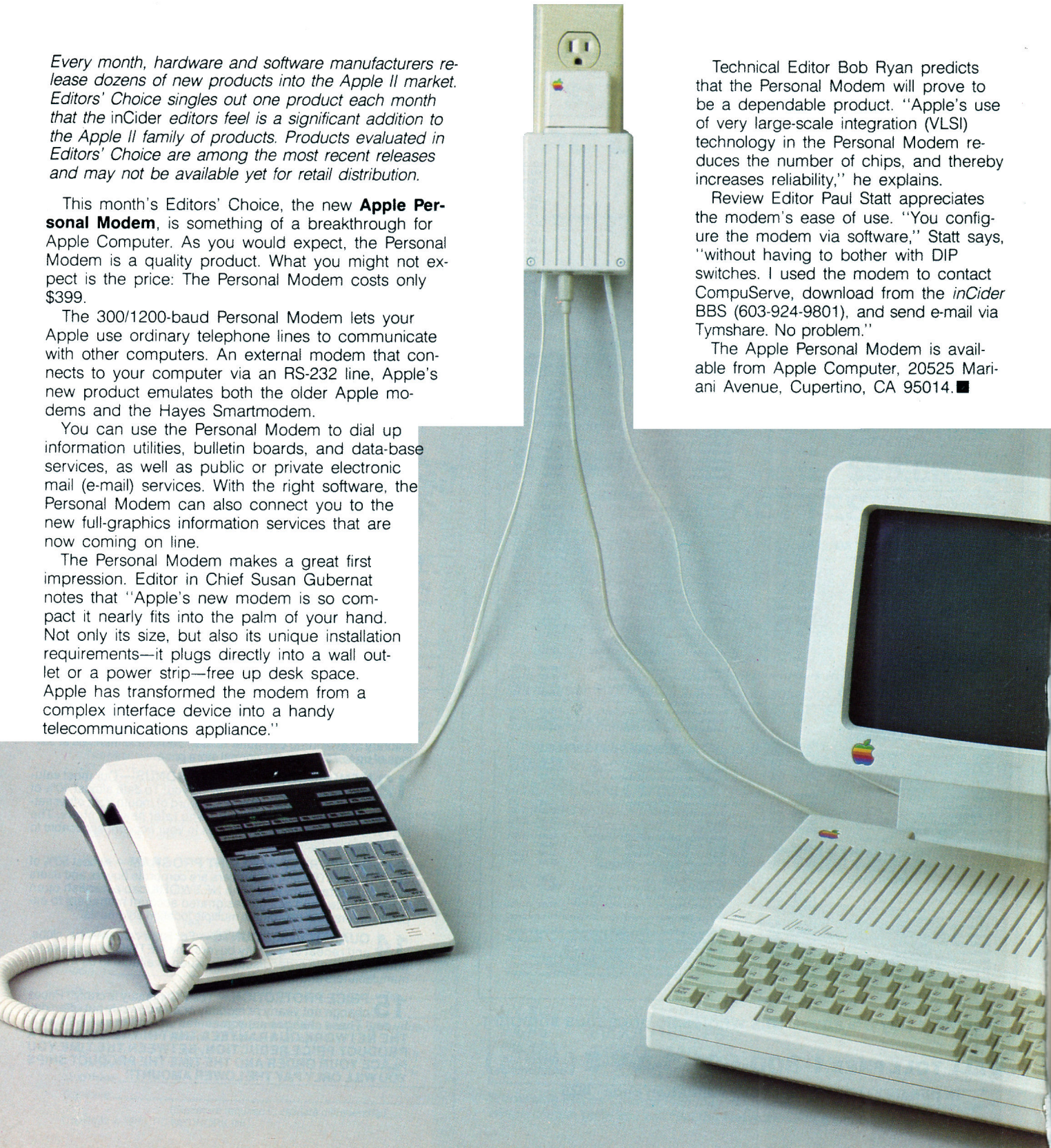
You can use the Personal Modem to dial up information utilities, bulletin boards, and data-base services, as well as public or private electronic mail (e-mail) services. With the right software, the Personal Modem can also connect you to the new full-graphics information services that are now coming on line.

The Personal Modem makes a great first impression. Editor in Chief Susan Gubernat notes that "Apple's new modem is so compact it nearly fits into the palm of your hand. Not only its size, but also its unique installation requirements—it plugs directly into a wall outlet or a power strip—free up desk space. Apple has transformed the modem from a complex interface device into a handy telecommunications appliance."

Technical Editor Bob Ryan predicts that the Personal Modem will prove to be a dependable product. "Apple's use of very large-scale integration (VLSI) technology in the Personal Modem reduces the number of chips, and thereby increases reliability," he explains.

Review Editor Paul Statt appreciates the modem's ease of use. "You configure the modem via software," Statt says, "without having to bother with DIP switches. I used the modem to contact CompuServe, download from the inCider BBS (603-924-9801), and send e-mail via Tymshare. No problem."

The Apple Personal Modem is available from Apple Computer, 20525 Mariani Avenue, Cupertino, CA 95014. ■



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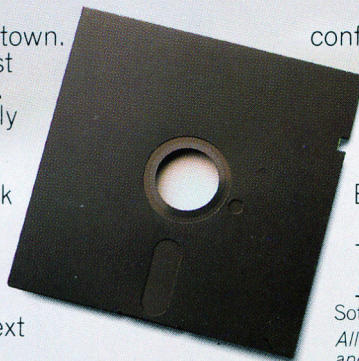
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	<input type="checkbox"/>	ORAN
Colors	<input checked="" type="checkbox"/>	PINK
	<input type="checkbox"/>	PURP
Timing Time	<input type="checkbox"/>	RED